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ABSTRACT

These proceedings are divided into two major sections. Section I contains papers based on original research and thought and are intended as examples of products of rigorous scholarship. This section is subdivided into three subsections covering the future, the present, and the past. Papers appearing in this section were reviewed by at least two researchers selected for their expertise relative to the article being examined. Twelve papers appear in this section. The second section includes descriptive or journalistic papers and program reviews. Papers for this section are intended to be useful and of interest to environmental educators. In all, 16 papers appear in Section II. A section of guidelines for authors concludes the document. (Author/RE)

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CURRENT ISSUES V:

The Yearbook of Environmental Education and Environmental Studies

Selected Papers from the Eighth Annual
Conference of the National Association
for Environmental Education

U.S. DEPARTMENT OF HEALTH,
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ENVIRONMENTAL EDUCATION INFORMATION REPORTS

Environmental Education Information Reports are issued to analyze and summarize information related to the teaching and learning of environmental education. It is hoped that these reviews will provide information for personnel involved in development, ideas for teachers, and indications of trends in environmental education.

Your comments and suggestions for this series are invited.

John F. Disinger
Associate Director
Environmental Education

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PREFACE

The Eighth Annual Conference of the National Association for Environmental Education (NAEE) was held 4 May through 8 May 1979 on the campus of Virginia Polytechnic Institute and State University in Blacksburg, Virginia. Two hundred and seventy-one individuals, from 35 states, the District of Columbia, and two Canadian provinces participated.

With this volume, *Current Issues* has found a new subtitle, *The Yearbook of Environmental Education and Environmental Studies*, and a new format. The subtitle, adopted by the NAEE Board of Directors at its May meeting in Blacksburg, represents a recognition of the distinction between *environmental education*--the delivery-oriented process of effectively presenting knowledge about our environment and our impact upon it to public school students and the general public; and *environmental studies*--the content-oriented interdisciplinary examination of the complex relations within man-environment systems that is designed to further basic understanding and ameliorate present and anticipated environmental problems. This new subtitle also underscores the two basic trusts represented within NAEE's membership itself, those who teach about the environment at the K-12 level or provide environmental information to the public at large, and those engaged in post-secondary environmentally related instruction and research. The change in title, then, is an acknowledgment of two connected but distinct interests within the broad field of environmental inquiry, and an attempt to wed these interests through the publication of quality work from both perspectives in one volume.

The publication of quality work has been the goal of *Current Issues* since its establishment, and the membership of NAEE and its Board of Directors have sought continually to develop ways of upgrading this annual collection of articles and reports. In an effort to elevate it from a "proceedings" to a "yearbook," *Current Issues* is now divided into two discrete sections. Section I, "Refereed Papers," contains articles based on original research and thought and rigorous scholarship. In addition to review by the editors, all articles submitted for this section are reviewed by at least two researchers selected for their expertise relevant to the article under scrutiny. Section II, "Notes and Commentaries," contains significant descriptive or journalistic papers and program reviews which do not qualify as research or scholarly works. Articles submitted for this section are evaluated on the basis of the usefulness of contributions, their readability, and their interest to the readers of *Current Issues*. The new "Guidelines for Authors" (page 295) describe the details of manuscript preparation and procedures for submission to *Current Issues VI*.

Since papers for the Blacksburg Conference were written and accepted for Conference presentation prior to the decision to change the format of *Current Issues*, the editors have broadly applied the above criteria to the papers that were submitted, and *all* submissions underwent peer review by at least two individuals in addition to the editors. (See "Reviewers," page vi.) In all, 46 papers were submitted. A total of 28 were accepted for publication (i.e., 61 percent of the total), 12 for Section I, and 16 for Section II. The editors have been greatly assisted in this review by Associate Editor, Dr. Thomas Tanner of Iowa State University, who provided special expertise in environmental education matters.

The editors are particularly appreciative that this new approach to Current Issues is marked by the publication of an invited "Foreword" written by Senator Gaylord Nelson of Wisconsin. Although we hope to make the guest authorship of the "Foreword" a regular part of future volumes of Current Issues, we are especially pleased that Senator Nelson, a national leader in the area of environmental policy and environmental protection, and one of the first public figures to acknowledge the significance of environmental concerns, willingly consented to write the first such piece.

We also wish to express our deep appreciation to the ERIC Clearinghouse for Science, Mathematics and Environmental Education for directly sponsoring the publication of Current Issues V. We are once again indebted to Dr. John Disinger, Associate Director of ERIC, without whose cooperation and assistance the Current Issues series could not be produced. His patience and his careful and professional attention to detail have been invaluable. In a similar vein, we would like to thank Ms. Joan Heidelberg, NAEE's Executive Director, and Ms. Pat Wackler, both of the Brukner Nature Center of Troy, Ohio, for their assistance in obtaining NAEE membership information and for providing cover graphics.

Finally, we would like to acknowledge with our sincere thanks the continued support provided to NAEE and Current Issues by the Institute for Environmental Studies of the University of Wisconsin-Madison, and the Environmental Studies Program of Iowa State University, through volunteering staff time, facilities, and a wide range of expenses without which this volume would not have been possible. Such assistance is in the best tradition of public service which has made the land grant university idea such a profoundly significant force within American society.

Arthur B. Sacks
Craig B. Davis
Editors, Current Issues V

O chestnut-tree, great-rooted blossomer,

Are you the leaf, the blossom or the bole?

O body swayed to music, O brightening glance,

How can we know the dancer from the dance?

William Butler Yeats
"Among School Children"

CURRENT ISSUES V:

The Yearbook of Environmental Education and Environmental Studies

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The editors would like to thank those listed below who graciously volunteered their services as reviewers for this volume of Current Issues. Reviewers were selected from within NAEE ranks and from without in an attempt to bring a broad scope of scholarly and professional expertise to bear upon the papers submitted.

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FOREWORD

There is an agonizing public reappraisal ahead in America's future. Increasingly, public awareness of limited energy supplies is being translated into widespread anguish and uncertainty. Citizens are seeking some sign of energy stability for their future. Unfortunately, there are no easy answers to be found.

One additional factor complicates the energy equation. Solutions to the energy problem must be developed in accordance with environmental standards. The developing body of environmental law has been achieved with much difficulty. Existing law is based upon extensive education of the public about the importance of satisfying environmental considerations in energy development. When energy was cheap and relatively plentiful, awareness of environmental considerations was difficult to sell to the public, but not impossible. Now that shortages are upon us and, more importantly, will remain with us for the foreseeable future, environmental considerations have become a political variation of the endangered species.

Public concern for a stable economy, adequate jobs, and reduced inflation, is assuming an urgency typical of a recession period. During such a time, what the public perceives as a frill is usually sacrificed. Recent polls indicate that public interest in adequate energy supply has prompted the majority of respondents to be willing to reduce environmental protection in order to guarantee a generous energy supply. If a sacrifice of substantive environmental law is accepted, the society must inevitably be the loser.

America is on the threshold of an era of critical choices. Problems in our present situation will be calamities in the future if our political and economic systems are not modified to maintain the balance between energy and environmental concerns. Such a balance can be maintained if energy consumption is restrained to meet responsible levels of energy supply. Supply and demand of finite energy sources promise to be increasingly in a state of imbalance. With a vigorous conservation program, citizens could ease the current pressure on the resource base to yield larger production from the limited energy potential. With reduced consumption, the carrying capacity of the ecological system is more likely to be capable of satisfying society's needs.

Clearly, the adjustments called for here are not easy. They represent changes in personal lifestyle for which there is no constituency clamoring to be the first to sacrifice. Consequently, the environmental movement is again thrust into an uneasy leadership position. To the environmentalists falls the task of asking their fellow citizens to be more satisfied with less. To the environmentalists goes the responsibility of defending an ecosystem which can only defend itself in retrospect when it deprives us of some resource we have complacently abused in the past.

The hope upon which human survival is founded is that citizens can be educated to act in their best interest. This is not a trite concern. Social change to promote collective self-interest over individual self-interest can only succeed if the participants, the citizens, are sufficiently aware of the costs and benefits of alternative actions. For years, environmental educators have been about the business of developing this kind of awareness. Insofar as they have succeeded, the world is a better place for their efforts. The 1979 version of Current Issues: The Yearbook of Environmental Education and Environmental Studies, marks another accomplishment in that effort. This volume emphasizes the importance of identifying problems, educating the participants, and guiding people to act more productively. There is no task more honorable for a citizen, educator, or public official. On the success of this and similar efforts, the future of our society must ride.

Gaylord Nelson
Senator, Wisconsin

SECTION I:

REFEREED PAPERS

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SECTION I: REFEREED PAPERS

As the headings of this Section indicate, time is the organizing principle employed in separating the 12 papers contained here into three subsections. Although this mode of organization admittedly is somewhat arbitrary and artificial, it is not inaccurate to note that even the titles of these diverse articles lead the reader toward a consideration of environmental issues, problems, and strategies that are rooted in the past, involve us in the present, and which must be faced in the future.

We have chosen to place the five articles that deal with the future first, neither because we are "gloom and doomers" preoccupied with a future apocalypse, nor because we are romantics whose eyes are set on the horizons of the future because we are so sick of the present. More simply, as environmental educators we are not only dedicated to an understanding of the present and the amelioration of stress upon ourselves and the ecosystem we inhabit, but are thoroughly committed to the future, for if we have learned nothing else, we have learned that the future is surely where we will be in the second that passes.

The articles which comprise "The Future" are concerned with the ethical and behavioral base upon which we may build a viable future (Shifferd; Bammel and Bammel); the web of social and economic interrelations that determine our future course as they shape the status quo (Detwyler); the particular difficulties we face as we experience the bitter ironies of the "Age of Energy and Technology" and seek alternatives to present modes of educating this age to new demands and new realities (Perrine); and recommendations for promoting plans for a future national environmental education strategy (Stapp, et al.).

The six papers which make up "The Present" are explorations of current problems and concerns particularly pertinent to environmental education in specific domestic and international locales. Though they are less global in scope than those in the previous subsection, they represent serious attempts to further environmental education research techniques (Bammel and Bammel); to develop modes of instruction which enhance classroom teaching, curriculum development and dissemination (Gardella; Tanner); to determine ways of bringing environmental education to bear in the commercial community of the U.S. (Brown and Ballinger) and of the preservation of wildlife abroad (Lively); and to assess employment trends involving students with undergraduate majors in environmental education (Johnson).

Only one essay comprises "The Past," Tanner's article examining the formative influences which have shaped the lives of conservationists. Those interested in the forces influencing the direction of a person's life toward becoming a citizen conservationist will find Schoenfeld's essay concerning "student eco-activists" an interesting companion piece (see Section II: "Notes and Commentaries," page 275).

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The essays collected in this Section have been accepted for publication after a careful process of peer review. The editors hope that the application of a rigorous review procedure will heighten the quality of *Current Issues*, and enhance the stature of environmental education in the public eye and in academic and political circles. This volume is a start toward these goals.

THE FUTURE

Kent D. Shifferd, *A VIABLE LAND ETHIC: THE WAYS AHEAD.*

Gene Bammel and Lei Lane Bammel, *LIFE STYLES, BEHAVIOR, AND FUTURE ENVIRONMENTS.*

Thomas Detwyler, *ENERGY, ENVIRONMENT AND SOCIAL CHANGE.*

Richard L. Perrine, *CONVENTIONAL OR "SOFT" ENERGY FUTURES: CONTRASTS AND EDUCATIONAL NEEDS.*

William Stapp, Janis Albright, Dorothy Cox, Dave Cyrus, James Greager, Thomas Hudspeth, David Jasperse, Lori Mann, Augusto Medina, Gary Prosch, Pamela Puntenney, Deborah Simmons, and Evelyn Wilke, *TOWARD A NATIONAL STRATEGY FOR ENVIRONMENTAL EDUCATION.*

A VIABLE LAND ETHIC: THE WAYS AHEAD

Kent D. Shifferd[1]

Abstract: *Can we construct a viable land ethic using the intellectual traditions of the west (the Judeo-Christian scientific and humanist and Marxist traditions), or must we turn to non-Western ideologies represented by eastern religions and the world views of traditional Native Americans? Such an ethic might be created from elements of the western tradition but it may not be radical enough to change behavior to the degree necessary to avert environmental decay. A more radical ethic might be constructed from non-western sources but might be too unfamiliar to gain wide popular support. The best hope is for a mingling of the two traditions, western and non-western.*

> "There is as yet no ethic dealing with man's relation to the land and to the animals and plants which grow upon it." (Aldo Leopold, A Sand County Almanac).

Although it is now 30 years since Aldo Leopold published the lines quoted above, we have made little progress toward developing a land ethic. Environmental ethics is an embryonic discipline, but those who pursue it are asking important questions including the following, which poses the topic for this paper: Can we construct a viable land ethic using the intellectual traditions of the West, or, must we turn away from our heritage and embrace an alternative philosophy grounded in eastern religions and nature mysticism? Land ethics are fundamental idea systems in which there is postulated a proper relationship between man and nature. Over the past decade, prominent observers have criticized what they have perceived to be the dominant land ethic of Western society, arguing that it is improper and, therefore, no longer viable. Our culture, they say, is an ecologically sterile ground, some even say a poisonous ground, in which to nurture a viable land ethic. Instead, we must listen to ancient and exotic songs from non-Western and more primitive societies. My purpose in this paper is to reflect on these twin assertions. I will suggest a theoretical structure for a land ethic, and some criteria by which land ethics might be judged, and I will offer suggestions for new syntheses drawn from the Judeo-Christian and Stoic traditions, Marxism, and mystic thought. I hope readers will forgive the absence of scholarly caution. A paper this brief is a small canvas and the brush strokes of necessity appear large and bold. I intend to generalize shamelessly, to both assume much and leave much out, and to both tantalize and provoke. First, I will review the standard criticisms of the Western land ethic.

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[1] History/Environmental Studies, Northland College, Ashland, WI 54806. Copyright © 1979 Kent Shifferd. All rights reserved.

Critics of the Western Land Ethic: White, Ehrenfield, and Paradise

Lynn White, Jr., is the best known critic of the dominant environmental attitudes in our culture, locating the origins of the current environmental crisis in two ideas which are rooted in the Judeo-Christian religion and which worked themselves out in the development of modern science. The first is our belief in progress, a belief implicit in the teleological notion of time inherited from both Judaism and Christianity. The second idea is the theory of dominion, involving a definition of man, who is made in God's image, and nature, which is not. Man, like God, is transcendent over nature, which was created by Him merely to serve man. Therefore, people who worshipped nature were idolators and their sacred groves cut down. According to White, this is the intellectual soil in which our attitudes are rooted. He argues further that about the 13th century scholars became interested in understanding God by means of understanding His creation, to "think God's thoughts after Him." Science and technology, he implies, are the contemporary source of environmental destruction. For centuries our limited understanding of natural processes had acted as a barrier, holding back the dominionist land ethic rooted in our religion. Modern science and technology removed the barrier and Western man has conquered the earth in modern times.

A more recent critic is David Ehrenfield, whose new book, The Arrogance of Humanism, sums up a growing attack on Western humanism as the ideological wellspring of the environmental crisis. He argues that humanism originated in the Judeo-Christian religion, where it was, at least, checked by notions of God's dominion, Christian humility, and stewardship. The declining power of religion in modern history has left us with an unchecked, aggressive, and selfish humanism as our guiding ideology, creating a "people versus nature" dichotomy. He lists the six assumptions, the principle one being, "All problems are soluble by people." The secondary assumptions are: "Many problems are soluble by technology; Those problems not soluble by technology...have solutions in the social world; When the chips are down, we will apply ourselves and work together for a solution before it is too late; Some resources are infinite; All finite resources have substitutes; (and) Human civilization will survive" (Ehrenfield, pp. 16-17). This anthropocentric point of view leads to an intellectual simplification of nature, and of human nature, which results in our attempts to simplify them in practice. In our humanistic culture, the manifold complexity of nature, its subtleties, its beauties, are all reduced to abstractions such as number, formula, and price. It is modern man's way of masking his ignorance of nature. Having mentally prepared himself, he is able to proceed with arrogant manipulation, that is, to practice dominion. Ehrenfield argues that this anthropocentric humanism is the single viewpoint underlying oil spills, chemically-intensive agriculture, pseudo-scientific testing in education, genetic engineering, the quest for fusion power, and all our efforts to maximize human control and short-term, material benefits without paying heed to their negative consequences. Given this man-centered tunnel vision, our solutions often become the problems. We, and the earth, are victims of an arrogant humanism.

A third critic is Scott Paradise, whose paradigm of the Western land ethic begins by agreeing with White and Ehrenfield that the dominion theory is a key to our despoilation of the earth. He goes farther, however, to illuminate certain economic and political assumptions left unmentioned by the others. In all, he has reduced the "American ideology of man and nature to seven propositions: 1) "Man is the source of all value;" 2) "The universe exists only for man's use;" 3) "Man's primary purpose is to produce and consume;" 4) "Production and consumption must increase endlessly;" 5) "Material resources are unlimited;" 6) "Man need not adapt himself to the natural environment since he can remake it to suit his own needs;" and, 7) "A major function of the state is to make it easy for individuals and corporations to exploit the environment to increase wealth and power" (Paradise). Numbers 3-7 describe assumptions characteristic of capitalism.

I believe these critics have identified many of the anti-ecological values and ideas which have dominated our culture in the past. I also agree with some of their critics (such as Dubos, Moncrief, and Fackre) who point out two dangers in a simple acceptance of their views. The first is that these traditional values do not represent the whole of Western culture. Indeed, all three say so at one point or another. The second is that anti-ecological conclusions do not necessarily follow from Christian and humanistic premises. (I can't say the same of capitalism.) One of my purposes is to suggest that a viable land ethic might be constructed on Christian and humanistic grounds. First, however, it is necessary to develop a model for a land ethic.

Land Ethic Model: Structure and Ideal Content

The first step is to determine the kinds of statements which make up a land ethic. The second, taken from an environmental perspective, is to determine the ideal content of the statements (highly subjective). Following this, I will re-examine portions of the traditional Western ideology and representative statements of non-Western, "alternative" viewpoints, to see how well they correspond to the model.

A land ethic must include three kinds of statements: 1) ontological, 2) epistemological, and 3) axiological. Ontology is the study of the nature of being, the conditions of existence. While this may seem to be a fairly abstract level from which to begin, many of the environmentalists' criticisms of Christianity and humanism are criticisms of their ontological statements. A land ethic, then, ought to include statements which define man, nature, and their ultimate destiny, distinguishing between that which they have in common and that which makes each unique. Statements on the nature of time are included here, as might be statements about a sense of place. The second category of statements, epistemology, deals with the ways of knowing nature. Some critics have argued, for instance, that the epistemology of Newton and Descartes blinds us to the ecological aspects of nature (Hardin, pp. 79-89). Some discussion of the appropriateness of rational, abstract, empirical inquiry versus intuitive, mystical, sensual and emotional ways of knowing is essential. Third, a land ethic must contain axiological statements, or a theory of value, including: 1) aesthetics (definitions of beauty and fitness); 2) a definition of what constitutes progress, or proper human expectations (including statements about risk-taking); and 3) a theory of ethics governing human interaction in times of environmental crisis (e.g., Garrett Hardin's "Lifeboat ethics"). It appears that a formal structure for a land ethic would require statements of these three types. What their content ought to be will vary from one person to another. I will suggest what seems ideal to me as a point of departure for debate, beginning first with the ontological statements.

An ideal definition of man and nature is a materialist definition. Man and nature are substance, molecules first and foremost, sharing the same essential make-up and design. We are the same stuff as the rest of nature, and especially as living nature. The matter and plan of organization are the same at the cellular and genetic levels. The value of a materialist definition is that it reunites man to nature. The natural world is seen to be our true home, and our only destiny (as opposed to the Christian view which places man's true home and destiny beyond time and nature and looks on earthly existence as a mere sojourn, a testing time). In the materialist view there is no escaping the consequences of our impacts on the biosphere. By predicating that man and nature are one, I avoid the traditional difficulty of the dominant Western ideology, the ontological separation of man from nature. Of course, the opposite problem has been created, that of distinguishing man from nature. The way to avoid this is by means of *a more sophisticated materialism that does not preclude the existence of spirit*. If this seems to be a contradiction in terms, it is so only within the traditional, Christian ontology in which spirit must be external to matter. By appealing to the concept of evolution, as does biologist Daniel Kozlovsky, we may be able to have our cake and eat it too, may be able to define man as a natural being but one unique within nature by virtue of his evolved capacities. In particular, Kozlovsky points to our evolved intelligence and our evolved creativity, or the powers of designing and realizing phenomena not otherwise found in nature, from art objects, to machines, to whole landscapes. This uniqueness is a matter of degree. We share the intelligence with the higher mammals, perhaps with the porpoises and whales, and the creativity with beavers and with the higher primates. But the capacity is ours to such an immense degree that we are unique *within* nature. Our gifts have come from the earth, "The scientific and Darwinian revolutions in the social mind mean that in one small instance, the evolutionary process has become conscious of itself. 'Mind' is molecules in an arrangement of such complexity that they are aware of themselves in that arrangement. It is an immense preciousness" (Kozlovsky, pp. 3 and 12).

In creating human intelligence, nature has created even man's ability to modify nature, thus creating man's freedom. *But the freedom to modify nature, to have dominion over it, is an evolutionary experiment at best*, as well as a trust, perhaps from God or some other spirit immanent in nature. This trust ennobles man. Man is the spirit-animal, the spirit-being, exciting, creative, but dangerous as well. His relation to the earth is that of dominion--that is a fact--but not of unlicensed dominion. Properly understood, dominion is a gift of natural evolution and can be either good, or destructive.

Concepts of time are also critical for a land ethic. Linear and cyclic concepts of time have both desirable and undesirable implications for human attitudes toward the earth. Cyclic time is desirable because it denies the ontological possibility of linear, or irreversible change, thereby denying the possibility of "Progress." Cyclic time emphasizes natural rhythms, and by cyclic time are all things brought to wholeness again. Guilt and sin are allayed. The great nature religions of the past relied on cyclic notions of time. However, a linear concept of time is desirable because without it evolution is inconceivable, and evolution is a hook on which environmentalists hang many hats. Linear time makes possible creativity as well as improvement in the human condition. The fulfillment of man's entelechy, the unfolding of human nature through history, as for example, in Chardin's definition of man as the "ascending arrow of evolution," is only possible within a linear framework (Chardin, p. 33). Ideally then, a land ethic would take into account both the linear and cyclic aspects of time, each expressed in ritual at the appropriate seasons.

A land ethic ought to include statements about man's place in nature. The geographic mobility that characterizes technically complex, affluent societies discourages intimate knowledge of the land because it does not rely on an intimate relationship with the land. Education in these societies trains the young for economic and technical behavior appropriate to industrial society, but rarely takes them out on the land or focuses on a sense of the bioregion in which they live. The closest they get is a universalized abstraction, classroom ecology. A land ethic ought to encourage an individual to perceive "his habitation as a part of himself, and (himself) an integral part of his habitation" (Opie). It is valuable to define ourselves as earth people, inhabitants of a little blue-green planet whirling in a lifeless void. But it is equally important to relate this universal notion to the soil at our feet.

These ontological statements defining man, nature, and their proper relationship are the first of three kinds of statements appropriate to a land ethic. The second are epistemological. In modern times, science has become the preferred and imitated way of knowing. Spectacular successes in the natural sciences have emphasized the utility of sensory observation, logical analysis, active manipulation of the subject under study, and quantification. These methods have spilled over into other disciplines, including even philosophy. But the ubiquity and primacy of these methods has not gone uncriticized. It is charged that, by themselves, they are not wholly efficacious, especially over the long run. At best, they represent a one-eyed approach, focusing on linear analysis of cause and effect, and missing the reality of systemic behavior. Garrett Hardin believes that the problem stems from the primacy of physics. "Why did most scientists take so long to accept the idea of a system? Physicists were at the top of the peck-order of scientists until about the middle of the twentieth century, and their habits of thought set the fashion for all science--and these habits did not include systematic thinking. Narrowly analytical thinking was the mode. Engineering, a child of physics, seldom departed from this pattern; much of the harm that engineers have unwittingly done to the environment is an inevitable outcome of nonsystematic thinking" (Hardin, p. 42). We need new ways of knowing, he argues, that take us from the concept of chain to that of network, and he uses the example of "ripples spreading out on a pond from a dropped pebble; they go on and on" (Hardin, p. 41).

Another missing element in the so recently dominant epistemology of modern science is the notion of soul or spirit. Philosopher Walter O'Briant traces this disenchantment of nature to the influence of Cartesian ideas which became the philosophical foundation for modern science;" ...as scientific men, we see the universe as morally and aesthetically neutral ...neither supportive nor hostile...it is simply neutral," and, for Descartes, "the method for understanding this world must be essentially mathematical" (O'Briant, pp. 84-85). These methods have been described as coldly abstract, reductionist, and overly rational, appropriate, perhaps, for astronomy but not for the study of life because they blind us to its richness, complexity and to our bonds with other species. Joan McIntyre writes: "We have, for too long now, accepted a view of non-human life which denies other creature's feelings, imagination, consciousness, and awareness. It seems that in our craze to justify our exploitation of all non-human life forms, we have stripped from them any attributes which could stay our hand. Try for a moment, if you can, to imagine the imagination of a whale, or the awareness of a dolphin. That we cannot make these leaps of vision is because we are bound to a cultural view which denies their possibility...that relegates feeling and emotion to inferior functions, that searches in vain for pure objectivity and in so doing denies the humanity of the investigator and the livingness of the creature under investigation...We are bound to a vision that leads us further away from nature, and further away from each other" (McIntyre, preface). Psychoanalyst Carl Jung has pointed to this narrow vision as a source of alienation: "As scientific understanding has grown, so our world has become dehumanized. Man feels himself lost in the cosmos, because he is no longer involved in nature and has lost his emotional 'unconscious identity' with natural phenomena...." (Jung, p. 13).

Science has been successful because it emancipated itself from animism, superstition, subjectivity, and from a view of nature as motivated by caprice. We should not reject these hard-won victories. There could be no successful land ethic in our culture without ecological science as its basis. But ecologists and the rest of us no longer need fear opening our minds to the legitimacy of other ways of knowing which complement, but do not deny the efficacy of science, ways that will restore wholeness to our epistemology. In McIntyre's words, "we have for too long accepted a traditional way of looking at nature and nature's creatures which has blinded us to their incredible essence and which has made us incomparably lonely" (McIntyre, preface). Writing about the death of the nature gods in our culture, D. H. Lawrence described the mental amputation we have performed on ourselves: "Of course, if I like to cut myself off, and say it is all bunk, a tree is only so much lumber not yet sawn, then in great measure I shall be cut off. So much depends on one's attitude. One can shut many, many doors of receptivity in oneself; or one can open many doors that are shut" (Lawrence, pp. 22-23). We need *to consider without insecurity and fear an investigative approach that combines the epistemology of ancient man who felt himself "indissolubly imbedded in the cosmos" and the epistemology of the modern scientist, who, for certain limited ends finds it useful to momentarily disassociate himself from nature in order to obtain but one perspective on it*. "I am convinced," wrote Claude Bernard, "a time will come when the physiologist, the poet, and the philosopher will all speak the same language and mutually understand each other" (Hardin, p. 48).

The third set of statements necessary to a land ethic are axiological and comprise a theory of value. These include a definition of human progress or human expectations, an aesthetic, and ethical standards to guide man in his interactions with all his fellow creatures. Together these statements provide a set of values which depict the ideal habitat and a means for resolving conflicts within it. The axiological statements depict what the man-nature community *ought* to be.

In America the indistinct notion of "progress" has governed our movement toward the ideal habitat, a conquered wilderness, in which a geometric arrangement of machines processes nature at an ever increasing rate. Of course, man must satisfy his material needs and has a right to some comfort as well, but the singleminded overpowering of nature that has occurred in recent history is counterproductive. "A conquered world is no good to man," wrote Lawrence, "He sits stupified with boredom upon his conquest" (Lawrence, p. 26). Man's relation to nature shapes both himself and the phenomenal world. In designing our habitat we design ourselves. "What, ideally, constitutes a high quality environment for man?" is the question of environmental aesthetics, or theories of what is beautiful and proper. The theoretical questions are: "What relation, if any, exists between aesthetic standards and nature itself?" (put another way, "Is the ecological analogy valid?"); "What is meant by fitness, what is appropriate to a region based on its natural and cultural evolution?"

Most of us carry about in our heads an underdeveloped aesthetic. We can tell intuitively what sorts of design are appropriate to a place. In a land of rushing trout streams, trailing arbutus, Norway pine, and a majestic, shining freshwater sea, there is something vulgar about a pizza palace with a cherry-red, plastic tile roof and a familiar logo announcing to all the tourists that the same pizza they can get in Schenectady or Los Altos is now available in northern Wisconsin. We sense that something is wrong when giant pines are bulldozed and, in the space of a weekend, a pre-packed, standardized, tract house is erected and the owner plants a pink plastic flamingo in the red clay. When the Department of Agriculture transforms a pretty, little-used woodland road into a 75-foot-wide, graded "Forest Highway," we suspect their environmental aesthetics are fairly primitive. What aesthetic standards can be made to apply in such cases? Aldo Leopold suggested three criteria (he left them undeveloped). *"A thing is right," he asserted, "when it tends to preserve the integrity, stability, and beauty of the biotic community"* (Leopold, p. 262).

North Country we may be fooled by a plastic ladyslipper at 20 paces, but closer inspection always results in a sense of having been cheated. Finally, evolutionary fitness refers to the achievement of form and function appropriate to the ecosystem. These are the elements of Leopold's biotic integrity and stability. They imply that *our aesthetic guideline should be, "That which is, is that which ought to be*." This raises the chief theoretical question in environmental ethics, the question of, "Can nature be the norm?"

This question has been brilliantly analyzed by Holmes Ralston III in an essay titled, "Is There an Ecological Ethic?" Can we derive prescriptive moral laws from a descriptive science, or, can we get from *is* to *ought*? Ralston argues that we cannot. We may have an *ethic* about nature, a Christian ethic, a humanist ethic, or another kind of ethic but it can only be *applied* to nature, in the sense that medical ethics is not derived from medical science, but only applied to its practice (Ralston, pp. 93-94). Nature has no intrinsic value. Its study yields only facts. Homeostasis, ecological balance, stability, biotic integrity--these are only facts and impose no moral obligations on us. Ralston's argument (more sophisticated than I have had space to recount) is a powerful one and he is right. But, he is right only insofar as the *is*, i.e., nature, be understood in terms of the ontology of Descartes and Newton, as a despiritualized other, unlike us. In fact, his argument is tautological. By asserting that nature is merely molecules, one must conclude that the only statements that can be made about it are those which describe the behavior of molecules. If nature is devoid of moral beings, and therefore devoid of moral worth it is outside the realm of moral precept. *It is only by performing the ontological lobotomy characteristic of modern science that Ralston's (and nearly everyone else's) position can appear to make sense*. Ralston has done nothing but take the major premise of modern science and restate it as its conclusion. Whether nature might be understood to have a spiritual and therefore moral dimension has been hinted at in this paper by the citations from McIntyre, Lawrence, and others. We shall return to it again, but first, I wish to comment further on Leopold's guideline.

The naturally evolved landscape is functional, long-enduring, and beautiful. It should be an aesthetic guideline for us, but it can only be a guideline. Applied as an inflexible rule, it would disallow art, or human modification of the biosphere. As a guideline, it suggests that human modifications ought to be patterned after nature, and that pink flamingos in northern Wisconsin are, therefore, vulgar and inappropriate. As a rule, art should draw on the riches of the biotic and cultural heritage of its region. However, universality and standardization are by no means always wrong. Indeed, they point to the common human heritage. And unlicensed imagination, creating forms that never were in nature, testifies to an essential characteristic of our species, our freedom from slavery to instinct. The point is, universalization ought not displace the principle of integrity and submerge the bounty of the world in dull sameness. In my estimation, it is at least worth debating the notion that aesthetic values, acting as guides for our humanization of the biosphere, can be drawn from nature itself. That moral values reside in nature is an argument that will take us outside

Biotic integrity I understand to be composed of the related concepts of variety, uniqueness, scarcity, and evolutionary fitness. First, variety: "The world," says Ian McHarg, "is a glorious bounty" (McHarg, p. 1). It is so because it offers us thousands of unique things with which to interact, thousands of species of plants and animals, of rock formations, of skies, of ecosystems, and human habitats in which to move and contemplate, and each is offered in its proper place and season. It offers us thousands of native materials from which to construct our built environment (even Pizza Huts) according to locally evolved designs that are not a force upon nature. It offers us thousands of sounds, each varying in season and place, whether water falling over granite ledges in the north or dripping from leaves in a tropical rain forest. And the world offers us thousands of cultural sounds, a great variety of musics and accents. Variety both makes life interesting and ecosystems more stable. The quality of being unique is closely related. There are many waterfalls, only one Morgan Falls (whatever its name)--uniqueness in its place. A third, related concept is scarcity, and a fourth is authenticity. In the the boundaries of our scientific culture, but we should at least make the effort to see what ideas lie beyond our little world.

The third part of a theory of value for the regulation of man's environmental behavior is a theory of ethics. We need to know not only what is beautiful and fit, but also what is just. Human relationships with each other and with the non-human environment ought to be governed by more than just ecological maxims and aesthetic standards, or else the relationship between individuals might be no more than that between predator and prey. It is possible, for instance, to conceive of an environmentally sound and aesthetically pleasing slave society. We must raise questions of rights, obligations, and equity. William Blackstone argues that our concern for a high quality environment includes a concern for the lives of all humans, even those not yet born. "A reverence for life must include a reverence for all life, including the unborn"(Blackstone, pp. 25-27). This does not mean that we ought to maximize the number of humans or material goods per capita. The overriding principle, the quality of life, acts as a systemic constraint on any one species and any one particular generation. In an age of scarcity, then, it is morally wrong for a nation to allow its population to increase --with all the consequent deprivation of others which that increase implies. It is equally wrong for another nation, which may have achieved ZPG, to waste resources by encouraging economic growth and inefficient consumption. (This is why capitalism, with its emphasis on material goods rather than well-being, on competition, on the private accumulation of wealth, and on economic growth is unsuitable as a regulator in an age of environmental crisis [Blackstone, pp. 135-137].) Every human being has a right to a livable environment, and therefore, there exists an obligation to aid in delivering such an environment. Part of that obligation consists in limiting the number of one's children.

A land ethic must also include a theory of redistributive justice if it is to be effective. If the disparity between the haves and the have-nots is too great (and it is), then the have-nots will disregard ecological sanity to gorge themselves in imitating the haves, and all will lose. The same will hold true if the haves fail to redefine the quality of life to exclude waste and materialistic gluttony. This is equally a matter of justice and of prudence.

Our obligations to animals, the various species of plants, and entire ecosystems, are linked together with our obligations to each other. We are obliged to preserve them because they are the means to a high quality of life for ourselves (prudence) and others to whom we are obligated, such as future generations. Our obligation to preserve them is rooted in human values (i.e., a high regard for each other's welfare of which they are a significant component). But their right to exist is independent of human values. That which man cannot create, he has no right to destroy. Their right to exist is more easily understood by adopting an ecological and evolutionary view of man's place in nature, one which demonstrates that we are not the end and culmination of evolution, or the only interesting experiment going on in the biotic world. Loren Eiseley wrote: "We are one of the many appearances of the thing called life; we are not its perfect image," and, "There are things still coming ashore" (Eiseley, pp. 59 and 64). The world was not made in our image, but we in its.

Ideally, then, a Land Ethic must include an ontology which unites man and nature, an epistemology which permits us to see that relationship scientifically and to see the wonder and the mystery of the natural world as well. It must include an axiology which defines the fit and the beautiful in natural terms, which precludes human discrimination and exploitation of humans and non-humans by according rights to all. Where in the cultural resources of Western man do we find support for such an ethic? We must suppose that most people will develop such an ethic out of familiar traditions, rather than abandon the familiar for exotic and foreign-sounding ideologies.

Western Cultural Resources for a Land Ethic

Both Greco-Roman philosophy and the Judeo-Christian religion contain much of what we want, although I will be able only to briefly allude to major ideas. The veneration for Mother Earth (that is distinguished chiefly by its absence in our culture) provided the all-pervasive background for the thought of the ancient Mediterranean. These mystic tendencies were balanced by a growing rationalism, but it did not lead to the aggressive notion of conquering nature, as it has in modern times. The difference is due, in part, to the all-pervasive concept of a designed earth. For the ancients, the world of nature was an orderly design which included man and his works. It was not an evil chaos against which man had to struggle. Quite the opposite was true. According to the Stoics, the world is a fit environment for man. There is a splendor in the cosmic order and joy in the beauty of the earth. For the Stoic, Panaetius, man is but one of the purposes for which the earth was created, and, in the words of historian Clarence Glacken, "he makes use of its beauties and resources" (Glacken, p. 53). For these Greeks, the world was both beautiful and useful. That the world is a glorious bounty was recognized in what scholars now call the principle of plenitude. According to Cicero, the world-mind had secured for the world, "first the structure best suited for survival, next absolute completeness; but chiefly, consummate beauty and embellishment of every kind" (Glacken, p. 59). Man fits into this order by creating a second world within the world of nature (not over and against it). Man's "Industry diversifies and adorns the lands," Cicero wrote, so that the human modification of nature is consistent with the teleological view of nature (Glacken, p. 59). (Note that our industry contravenes this principle.) Man's art follows nature. In the Stoic view, he is a finisher of the design (and not one who alters and effaces it), a caretaker of the earth. Man, then, is in nature, but he is unique within nature. Glacken has summarized the Stoic's point that man's endowments allow him more freedom to understand, appreciate, and improve nature and to benefit by its use. "The Stoic idea of sympathy is at work here; there are interconnections and affinities among things in the whole creation, strong bonds between the macrocosm and the microcosm that is man" (Glacken, p. 57). More ought to be said, but it is enough, here, to suggest that the ontology of the Stoics is, for our age, a storehouse of intellectual treasures.

The distinctive character of ancient Greek epistemology was its emphasis on reason. Only a rational mind can understand a rationally ordered cosmos. But it was not limited to reason, especially during the later, Hellenistic era, as it was represented in the work of Plotinus and his followers. For them the cosmos was a great soul, "a living, organic whole, the best possible image of the living unity-in-diversity of the world of Forms in Nous. Such a philosophy, with its emphasis on life, its fullness and diversity, produces a vivid and rich view of the earth" Glacken, p. 77). Perhaps, in the views of Plotinus, we can find some of the material for a synthesis of the rational and spiritual ways of knowing and achieve the wholeness that Lawrence, McIntyre, and Jung say we have lost. The ontology and epistemology of the Greco-Roman past may be an open door to our future.

As for ancient ethics, it is enough to say that all the ancient philosophers, including even the Epicureans (whose views are so monstrously distorted) looked on the good life not as a hedonistic gratification of materialistic pleasures, but as a moral, civil, and intellectual life characterized by moderation. They stressed the love of nature. And if, as was the case, they were humanists, and the love of nature represented by Hesiod, Horace, Vergil, Columella and others was a love of humanized nature, of a rural blend of the contrived and the wild, that is to the credit of humanism; it demonstrates that what is lacking in our overly mechanical, consumerist world is the humanist definition of a fit and beautiful habitat for man. In the humanism of the ancients, man is a sensitive, creative, spirit-animal who excells at taking joy in nature's beauties and in his creative arts. Humanism does not imply the arrogance with which Ehrenfield charges it. One need only recall the doctrine of hubris, or overweening pride, which formed the central theme of ancient Greek drama. What is wrong with the contemporary environment is that it is dehumanized, and, therefore, despiritualized.

Gabriel Fackre, an apologist for Christianity, makes a similar argument. The cause of the environmental crisis of modern times, far from being found in Christianity, is found in its absence from the modern world. The much criticized ontological statements found in Genesis have been taken out of context by modern man. He has regarded only the injunction to "subdue the earth" and has disregarded all the limitations and qualifications which give it its true meaning. Fackre tries to restore a perception of the wholeness of the Judeo-Christian doctrine of Creation by pointing out three ideas. First, the goodness of nature; the text of Genesis reads, "and God saw that it was good" after each of the acts of creation in the first six days. It is true that nature is not sacred in Christian thought (for that would be idolatry), but it is good and enjoys what Fackre calls a "derived dignity." Second, although man is made in the image of God, he is made out of clay, he is rooted in nature. He enjoys a uniqueness by virtue of his God-like attributes, his intelligence and creativity. If some later Christians adopted the gnostic attempt to define the clay as wholly evil, to set up a dichotomy of matter as evil and spirit as good, this has not been generally approved doctrine in the Church. Of course, man enjoys a uniqueness by virtue of his God-like attributes, his intelligence and creativity. They give him the role of co-creator--he does have dominion over the earth but not unlicensed freedom. The earth is already created, a given, when he receives his power. Moreover, only God is creator *ex nihilo*. Man cannot create a species. Man is responsible to God, a steward of the earth, but not God of it and over it. Dominion implies responsibility. It is when man ignores his caretaker role, and, playing God, acts in a totally selfish manner, rearranging the given, that we can see him playing the role of Adam. It is because of Adam that nature becomes accursed. Fackre writes, "Our present environmental plight is traceable to man's failure to acknowledge the limitations attendant to his subsidiary creatorship....For overreaching his finitude, he must suffer the consequences...the ecologically sensitive today recognize in the (Adam and Eve) saga some very accurate reporting of the terrors that nature has in store for a technological society that tries to play God" (Fackre, p. 123).

The epistemological problem is similar. Modern scientific epistemology is incomplete without the Christian recognition that there are other ways of knowing. The laboratory report must be seen in the context of relevation, both biblical and historic. Scientific knowledge must be viewed in the moral context of intellectual humility, rather than with the arrogance to which Ehrenfield is so appropriately sensitive. Nor is scientific knowledge repudiated by Christianity. Nature is the *codex dei*, and it is appropriate to think God's thoughts after him. Christians would argue that is exactly what ecologists are doing when they discover the interdependence fragility, and beauty of the web of life, and when they warn us not to destroy by our consumeristic greed what we cannot create.

On the question of ethics the Christian world view is easily adapted to environmental concerns. With regard to the good life, it is clearly opposed to the rampant consumerism of twentieth century man. But it is not blind to man's need for sustenance and for a decent material life. It is very clear on the obligations that men have with regard to one another in an age of scarcity when the technological power of some degrades the quality of life for others. The Judeo-Christian tradition has a long record of concern with the morality of power and with sensitivity to suffering.

I have briefly alluded, here, to certain aspects of our culture which I believe are useful in restoring to ourselves a sense of worth, reporting that a viable land ethic might be built upon Stoic, humanist, and Christian grounds, a land ethic which would preserve both the dignity of man and the beauty and integrity of the natural world. Many will listen to the ecological message only if they find it conveyed in familiar themes. Arthur C. Danto has argued persuasively in *Mysticism and Morality: Oriental Thought and Moral Philosophy*, that we will not adopt non-Western attitudes about the reverence for life and the sacredness of the earth because we cannot believe non-Western ontology. He says that before we know how we *ought* to act toward the world we must first know what it *is*. "Merely preaching a different morality, however, is unlikely to alter a practice. But, changes of heart may come through changes of mind" (Danto, p. 14). His point is, modern science tells us that the idea of "Mother Earth" is only a charming, but childish, analogy. To believe it literally would be superstitious. Our ethic must rest on fact, and fact, for most of us, is not the same as fact for the non-Western mind. For most of us the groves are no longer sacred. They may be both beautiful and useful, but we do not talk reverently to trees. Therefore, we had best look to our own, rationalistic culture. I am not saying that we should don the toga or the monk's habit and imitate the past; that cannot be done and should not be tried. But cultures evolve by reevaluating their heritage, by testing experiment against experience. I find it satisfying to know that our culture is not sterile ground in which to sow a viable land ethic. But I do not find it satisfying enough. I see no reason to refuse consideration of insights from other cultures, including those of the Native Americans and eastern peoples, as well as insights from the rebels within our own culture, the Marxists. It is legitimate to argue that the weight of recent tradition lies so heavily upon both our natural and spiritual environment that we can be saved only by radical change. We must seek dramatic alternatives to our present land ethic, beginning, perhaps, not with a non-Western ideology but with the ideas of Karl Marx.

Land Ethics and Marxism

Marxism is badly misunderstood among many environmentalists. They assume it is merely a collective form of capitalism with the same materialistic values and the same worship of technology. The Soviet experience frequently confirms this view, which proves only that Marxism is badly misunderstood in Russia, too. Actually there are as many variants of Marxism as of Christianity and we would be wise to see what in these might be helpful in our time of need.

One aspect of Marxism, stemming from its justice-oriented axiology, is the idea that society exists to manage man's relationship with nature. In Marxist society, man's interaction with nature is social, it is a rational interchange, planned at the level of society with forethought given to needs and priorities and to the most efficient means, in contrast to the wasteful, competitive anarchy of capitalism. In a Marxist society, economic growth can be controlled and channeled, whereas in a capitalist society it is an independent variable, the incremental result of thousands of socially and ecologically blind decisions. Socialism is, *a priori*, a governable system. Capitalism is a non-system whose environmental impacts are susceptible to social influence only on an *a posteriori* basis. Introducing regulation into a capitalist system is not the same as making it a socialist system because regulation contravenes the essence of capitalism and sets up conflict within society, whereas a socialist system is designed to eliminate conflict and disharmony in the productive process.

The ontology of Marxism is teleological. There is an explicit view of man and nature. Based on materialism, man is in and of nature. It is his body, as Marx says. His analysis begins with the soil, that is, with nature and man's relation to it. "Nature," Marx wrote, "is man's inorganic body-nature, that is, insofar as it is not itself the human body. Man lives on nature means that nature is his body with which he must remain in continuous interchange if he is not to die. The man's physical and spiritual life is linked to nature means simply that nature is linked to itself, for man is a part of nature" (Marx, pp. 112-115). These ideas of balance and interpenetration are carried through in Marx's imminent teleology. Both nature and man are emergent, but the ideal humanity which is emerging here is not that represented by the Corps of Engineers general or the corporate executive sealed away from nature in his fiftieth floor office. "What develops out of this is that man begins to create," writes Marxist Gary Chamberlain. "For the first time the wealth of human sensitivity develops in the unfolding of the wealth of nature. In other words, brute senses become more sensitive to such objects as the meadow-lark's shrill cry or the brilliant rays of the rising sun" (Chamberlain, p. 309). The emergence is anthropogenetic. Its goal is the creative, multi-faceted personality. Through history men interact with nature and each other to create a biosocial environment which offers ever greater opportunities for the development of individual personality and, thereby, for the species. History is a process leading toward a highly developed humanity living in harmony with nature, a direct contrast to life in the industrial slums of England where Marx lived. In contrast to the conquest of nature, Marx looked forward to "the unity of being of man with nature--the true resurrection of nature, the naturalism of man and the humanism of nature both brought to fulfillment." This, he believed, would lead to "the genuine resolution of the conflict between man and nature" (Marx, pp. 112-115).

Of Marx's ethic, it is enough to point up the obvious. Marxist ethics are rooted in the biblical concept of distributive justice and in the moral assertion that those who exercise power, all kinds of power (including technical and economic), ought to be responsible to those who are affected by it. Much more could be said about the Marxist land ethic, including its omission of any sensitivity to wilderness. Marxism is, after all, well within the bounds of Western culture. It is a naturalistic variant of humanism and it is capable of an ecological reformation, whereas capitalism is not.

Non-Western Cultural Resources

While it is not too hard to appreciate certain Marxist ideas, it is very hard to become an Indian, whether of the Native American or the Hindu variety. Each subscribes to an ontology radically different from that of our cultural mainstream, but it is precisely this difference which makes their consideration advantageous. J.W.E. Newbery has discussed Native American insights, describing their ontology as a "psychical ecology." He writes, "The word for the Amerindian world view is wholeness. The universe with all its parts and powers is one. It is a living body of many members so closely related in all pervading spirit that it is not surprising even when metamorphosis takes place, a man becomes a bird, for example, or a bear becomes a man. It is a wholeness so complete, so spiritual, and so commanding that every rite and ceremony of native life relates to its celebration or renewal" (Newbery, p. 57). Here, at last, we are in a different world. This is the telescope through which we are afraid to peer. One paramount symbol of this ontology is the circle.

Lame Deer writes, "To us this is beautiful and fitting, symbol and reality at the same time, expressing the harmony of life and nature. Our circle is timeless, flowing; it is new life emerging from death, life winning out over death" (Newbery, p. 58). This is an intensely subjective ontology, a more-than-rational ontology likely to be scoffed at by mechanized urbanites who have learned to perceive nature only through the eyes of Newton and Descartes, and who are removed from nature by middlemen and machines.

The ethics of native Americans are founded on this holistic ontology. A physical act, such as taking and hoarding more potting clay than is immediately useful, does violence to the spiritual balance of life upon which ecological harmony depends. Newbery has encapsulated the ethic in a creed, part of which is exerpted here:

> The World, the universe with all its parts and powers is ONE.
>
> Within the whole each part has its place, depending on, and giving support to all the others in the great body of life.
>
> Each part is intended to use what it needs for its well-being and will satisfy its needs respectfully, gratefully, and sparingly. No one may, without thought or good purpose, cut a tree, plough a field, crack a rock, or kill an animal. Life will reject those who do so.
>
> No part may dominate or exploit another, for each part has its own right to be and to live as was intended.
>
> No part has the right to despoil or destroy or pollute any part of the universe and the Spirit of Life will reject those --person, people, or company--who so act.

> Health and happiness are found in living in reverence before Life, and in harmony with all creatures.
>
> Live reverently. Live simply. Live for wholeness.
>
> (Newbery, pp. 57-58)

Walking into the mental world of the Amerindian requires us to cross a great philosophical gap, as does attempting to enter the mental world of Hinduism. But, as in the case of the Amerindians, the contrast between our secular view of life and their sacred ontology is worth investigating. According to Rajagopal Ryali, there are three entry points for a beginning understanding of Hindu teachings on man and nature. These are: 1) the doctrine of transmigration of souls; 2) polytheism; and, 3) a tendency to symbolic mysticism and monism. First, "The doctrine of transmigration of soul is easily misunderstood... unless...viewed in consonance with its corollary that the living essence of all beings, both plants and animals, is the same." The emphasis, he says, is on "the organic unity of all living beings" (Ryali, p. 48). Second, the apparent polytheism of Hinduism is actually subsumed in a fundamental monism. The various deities represent different aspects of nature and "the entire nature was in some sense divine. Through polytheism the Hindu worshipper acknowledged the power of Nature and the need for human symbiosis with nature" (Ryali, p. 49). The third characteristic is the tendency toward a radical monism, "an ultimate lack of distinction between man and universe" (Ryali, p. 49). This tendency pervades eastern thought. It is present in Buddhism: "The awakened one teaches that existences which appear separate are dependent upon one cause and upon one another, and that their apparent separateness springs from ignorance and illusion..." The uniqueness of the Hindu ontology is that spirit is both imminent and transcendent. "The Hindus believe in the identity of the supreme being with nature...he is both imminent and transcendent. Krishna in Bagavat Gita states: 'I stand pervading this whole universe with a single fragment of myself'" (Ryali, p. 52).

What are we in the West to make of these two Indian views? The first point is that we already have begun to do something with them. There are numerous examples, such as Herman Hesse's novel, Siddartha, but I will choose only two writers who represent a newly emerging viewpoint, Daniel Kozlovsky and Gary Snyder. Snyder is a poet living in the desert southwest much like the ancient Indians whose ways, along with the ideas of oriental masters, inform his poetry. "I am a poet," he writes, "My teachers are other poets, American Indians, and a few Buddhist priests in Japan. The reason I am here (testifying before the Congress) is because I wish to bring a voice from the wilderness, my constituency...the voice that speaks to me is the voice of nature herself, whom the ancient poets called the great goddess, Magna Mater. I regard that voice as a very real entity. At the root of the problem where our civilization goes wrong is the mistaken belief that nature is something less than authentic, that nature is not as alive as man is, or as intelligent, that in a sense it is dead...you cannot communicate with the forces of nature in a laboratory. What we must find a way to do, then, is incorporate the other people, what the Sioux Indians called the creeping people, and the standing people, and the flying people, and the swimming people--into councils of government....If we don't do it, they will revolt against us. They will submit non-negotiable demands about our stay on the earth" (Snyder, p. 108).

In order to appreciate this, one must begin with the admission that one must begin, that is, we must relearn. The mystic view cannot be discovered by reading books in centrally air-conditioned libraries. One must get out-of-doors to achieve perspective, as in Snyder's poem, "Pine Tree Tops":

In the blue night
frost haze, the sky glows
with the moon
pine tree tops
bend snow-blue, fade
into sky, frost starlight.
the creak of boots,
rabbit tracks, deer tracks.
What do we know?

Snyder's advice to the children: "Stay together/learn the flowers/ go light." And, in a poem titled "By Frazier Creek Falls:" "This living flowing land/is all there is, forever/we are it/it sings through us/We could live on this Earth/without clothes or tools." Snyder's poetry blends Western and non-Western ideologies into an alternative Land Ethic for modern man, one which, by its very contrast to the dominant culture, yields us a valuable perspective.

Daniel Kozlovsky was trained as a biologist but left the university to farm in the old way. His mystic sense of unity, seemingly so oriental, is based in fact on molecular biology and the theory of evolution. His ontology is radically monistic. "You are," he writes, "nothing but an interesting combination of earth's rocks, water and air; these and two billion years of evolutionary explorations, new trials, new combinations, new forms;" and, reiterating, "Mind is molecules in an arrangement of such complexity that they are aware of themselves in that arrangement. It is an immense preciousness" (Kozlovsky, pp. 3 and 12). He reminds us that the earth began as a cloud of stellar dust which condensed, as it were, into the ball of rock we know. He traces all geological, biotic and human history using this metaphor of condensation and the idea of the noosphere, or world of the mind and spirit. "Biosphere is a condensation, a reorganization of lithosphere, hydrosphere, atmosphere; it cannot be separated from them, it cannot do without them, since it is a form of them, constantly exchanging materials with the others. Noosphere is a marvelous expression of a new development in the arrangement of part of the biosphere, and is therefore a rearrangement of the other spheres. Your thoughts derive from the interaction of rocks, water, and air in the neurons of your brain! By this means can rocks, water, and air think and contemplate themselves in this corner of the universe" (Kozlovsky, p. 20).

Man is no more than a special arrangement of nature. But he is free in a way that the other arrangements are not. Our lawless imagination is our species nature. On this ontology, Kozlovsky builds a preservationist land ethic. Both Snyder and Kozlovsky offer us examples of modern men, cognizant of ecological science, but satisfied in the end only by adding to it the ancient, mystic and oriental visions of the unity of all life.

Conclusion

I began this essay by asking if it was possible to construct a viable land ethic using the intellectual traditions of the West, or if, failing that, we would have to turn away toward ancient and eastern mysticism. I have suggested, for purpose of debate, that it is possible to ground a reasonable ethic in Western philosophy and religion, including the Marxist tradition. Whether that will be enough or not, I do not know. All we can be sure of is that "Nature never breaks her own laws," as Leonardo pointed out. Nor do I suspect that such an ethic grounded in traditional Western ideology will satisfy all of us. It is also possible to ground a more radical land ethic in more radical theologies such as those of the Native Americans and the Hindus, but these will be much transformed in the process. More than likely they will contribute to a new synthesis, an eclectic, scientific mysticism which will result in a world view far different than that which now dominates the Western mind. It is enough to know, for now, that there are ways ahead. What is lacking to us is neither knowledge nor vision, but will.

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LIFE STYLES, BEHAVIOR, AND FUTURE ENVIRONMENTS

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Abstract. *Futurists see the next 20 to 50 years as a critical period, due principally to sweeping changes imposed by technology. The crux of this transition is the change in life styles, as the ethos of consumption is replaced by a transformative ecological ethic. The outcome will be a leisure life style that stresses contemplation and conversation.*

Introduction

Every culture in recorded history has been blessed (or cursed) with prophets of prosperity (or gloom and doom). American culture abounds with future-tellers, some influential, some trodding only the dark sequestered staircases of academe. The most internationally recognized 20th century voice of the future is Alvin Toffler whose book Future Shock (1970) sold over six million copies in 20 languages. Toffler suggests that there are three stages in human societal development: (1) 10,000 years for agriculture, (2) a century or two for industrialism, and (3) a current, rapid transition into "super-industrialism." His premise is that in order to avoid bloodshed during the next few decades we must begin now to plan, develop, and test very long-range strategies that will create a new future for this country and the entire world.

These predicted changes must be planned quickly, since those factors upon which industrialism has been built are rapidly facing severe limitations or extinction. Cheap raw materials, non-renewable fossil fuel energy, and electro-mechanical technology are in finite supply and cannot keep up with the current demand. Supersaturated urban concentrations, growing unemployment, and the stress imposed by a growth ethic indicate the severe and insufferable strains under which current industrial society is laboring (Toffler 1976).

Industrialism has provided a multiplicity of alternatives but the unchecked development of technology seems to drown people with overchoice. A car buyer is now faced with 25 million or more potential choices when variations of style, color, accessories, etc., are considered (Toffler 1970). Not only must people be efficient information processors, but they need to be flexible enough to cope with the increasing number of changes and events that occur each year in their lives.

There are indications that as the number of events in each person's life is increasing each year, the overall quality of those events is decreasing. In 1960, for example, there was a 65 percent chance that a major event would occur in a person's life; the odds increased to 90 percent in 1977. During that 17-year span the likelihood of a "bad" happening (divorce, death, unemployment, motor vehicle injury, admission to hospital, violent crime victim, property crime victim, or being placed on welfare) was increasing faster (46.9 percent) than the likelihood of a "good" event (41.4 percent) (Futurist 1978:337).

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Many futurists see a revolutionary transition taking place in the next 20 to 50 years. The period of transition could result in extreme turbulence. The last industrial revolution produced demographical changes, starvation, civil wars, and the large-scale exploitation of people. The new revolution is supposed to occur more quickly and be more universal. The urgency of advanced planning is all the more imperative if we are to optimize these inevitable societal changes.

The purpose of this paper is to encourage environmental minded people to reflect on potential life style and behavioral changes, and to encourage some reflection on the environmental causes and consequences of alternative future life styles.

Futurists: Who are they, What are they?

Edward Cornish, author of The Study of the Future (1977), president of the World Future Society, and editor of The Futurist, enumerated three basic characteristics of futurists (Cornish 1977:380-381):

1) Futurists tend to see the universe as existing in one piece rather than as an aggregate of independent units. This "holistic" view places people as part of the universe and affirms that there is a unity of time as well as of space. The implication is that the future world will not come to be by accident, but will be a product of current choices and behaviors.

2) Futurists place a crucial importance on time. Instead of being occupied with the present, futurists are concerned with a period of 5 to 50 years in the future. The significance is that people are not likely to notice gradually compounding changes.

3) Futurists stress that the future is shaped by the events of the past as well as by images of the future. The realization that by building images of the future we can actually effect which future will occur should provide motivation for all environmentalists to take part in discussions of alternative futures.

One may assume that all futurists have a holistic view of space and time, all attach special importance to future time periods, and all have an affinity for ideas. The community of convictions could stop there because futurists do in fact vary on their (1) styles of forecasting, (2) values, (3) view of change, (4) attitudes, (5) time frame, and (6) stand as to who are the appropriate decision makers. Futurists can conveniently be categorized as (1) those attempting to forecast the most probable future, (2) those attempting to forecast the possible futures, and (3) those seeking to bring about the most preferable futures. It is difficult to place individual futurists into any one of these neat categories, but some writers pick Lester Brown of the Worldwatch Institute as an example of the first group, Herman Kahn of the Hudson Institute of the second, and a range of miscellaneous politicians (depending somewhat on which way the wind is blowing) as representative of group three.

Some futurists clearly indicate their values while others believe it necessary to remain as apart as possible from moral, political, and emotional values. The latter tend to use a mathematical mode of presentation. Change can be viewed on either an "extrapolationist" or "revolutionary" premise. The former is characteristic of linear thinkers who believe that what exists will continue to develop, while the others contend that society is broaching a new technological, economic, and social stage in which the framework and substructure of the previous stage will no longer be pertinent. Some who are involved with future studies can be called "humanists," for they are primarily concerned with the quality of life and human relationships. "Technologists" perpetuate systematic methodology which deals with those aspects of the environment which can easily be quantified, while often overlooking those other considerations that tend to be more intangible, more difficult to measure. One may choose a variety of time frames, from the immediate future which is seen as six months to two or three years, to the intermediate future, say, 25 years ahead, to the other end of the continuum which discusses the long-range future, 100 or more years ahead of us. Some people involved with the futurist movement may be called "participationists" because they see entire societies being part of the decision-making process instead of being reserved for experts and politicians or an "elite."

Why A Transformation?

Mass media occasionally have dealt with themes of future change, change that seems inevitable. Frequently, these forecasts are based on some variation of the theme that current problems appear to be unsolvable in the light of current paradigms (Harman 1977b). Historical research has isolated various "lead indicators" that have repeatedly preceded times of drastic cultural change throughout history. It is apparent that a substantial number of these advance indicators are present in today's society. People do feel a decreased sense of community accompanied by an increased sense of alienation and purposelessness. The population suffers from an increased amount of personal disorders and mental illness. The rate of violent crimes has escalated along with the frequency and severity of social disruptions which have required increased use of police. A greater interest is expressed in noninstitutionalized religious activities along with an increasing public acceptance of hedonistic behavior. In addition, there are signs that individuals have a conscious anxiety about the future (Kuhn 1970).

Analysis of public opinion polls, as well as larger-term cultural indicators such as the themes of recent books, plays, motion pictures, etc., and the recent scientific interest in altered states of consciousness, suggest that values which have long held the allegiance of large groups in western societies, are not only beginning to change, but are subject to rapid dissolution. Willis Harman, of the prestigious Stanford Research Institute, has pointed out that the small number of desirable paths to the future all "require a drastic and prompt shift in the operative values of the society and a corresponding change in its institutions" (Harman 1977a:5). Unless society is able to make this major transformation, dilemmas related to growth, control, distribution and work-roles may be unresolvable.

Harman believes that this all but inevitable major transformation would be enhanced by electing two ethical positions: an ecological ethic and a self-realization ethic. An ecological ethic expresses the idea that the entire human race is one, and that a total "community of man-in-nature" exists. This view recognizes the limitations of natural resources and holds people responsible for both proper management of the planet and the fate of future generations. Moreover, development of self and the human species through appropriate experiential learning would help decentralize social decision-making. A self-realization ethic would encourage a strong free-enterprise private sector while de-emphasizing public bureaucracy.

In order for these sometimes contradictory ethics to succeed, citizens must become more attentive to future consequences and enter into decision-making processes. Society is faced with a new type of scarcity. The old form of scarcity was overcome by technological improvements and/or expansion into additional territory. The old solutions are not applicable to a new scarcity based on finite planetary limits of fossil fuels, strategic minerals, natural fresh water, food-productive arable land, habitable surface area, the waste-absorptive capacity of the natural environment, and the limited resilience of the planet's life support ecosystems (Harman 1977b:7). A new era of enlightenment requires a heightened awareness of self-realization occurring only within communities, and will be rooted in awareness of the fundamentality of interrelatedness. Philosophically, we have moved from the universe of Leibnizian monads, discrete substances unrelated to each other, to the universe of mutually occurring foci of Whitehead. This is the universe of mutually sustained noospheric evolution limned so poetically by Teilhard de Chardin.

What Alternative Futures Are There?

The possibilities for the future may be categorized under four separate headings:

1. Technological Salvation
2. Descent into Social Chaos
3. Benign Authoritarianism
4. Humanistic Transformation

There are those who are confident that technological know-how can extricate us from the problems which it created, and speed us along the lines of permanent material growth. There are, on the other hand, catastrophists who foresee a rather dim future of societal tension and stress. A number of economists, Heilbronner among them, have affirmed that the best future we can hope for is one of benign authoritarianism. Toffler has advocated public participation in order to keep power away from the 1984-style bureaucrats, lest people be locked into a system of entrenched benign authoritarianism that penetrates every facet of life. "Humanistic transformation" is an alternative which combines the optimism of technological salvation with hopes for changes in the human personality. Ecological and self-realization ethics mentioned previously would be basic to this option.

Voluntary Simplicity. The four possible alternatives noted above are not necessarily mutually exclusive. In fact, a widely desired possible future society is based on the humanistic transformation to voluntary simplicity made feasible by a form of technological salvation called "appropriate technology." Both Duane Elgin and Arnold Mitchell, researchers for the Center for the Study of Social Policy at the Stanford Research Institute, believe that "it could grow to major proportions by the year 2000" (Elgin and Mitchell 1977:256).

Voluntary simplicity, first described by Richard Gregg, embraces a way of life that is outwardly simple while being inwardly rich. Those practicing voluntary simplicity would be frugal consumers with a strong environmental concern and with a sense of urgency. It is proposed as the most rational response to the current world situation (Elgin and Mitchell 1977:200). More specifically, the underlying values include material simplicity, the establishment of human-sized living and working environments, less dependency on complex institutions through self-determination, ecological awareness of the interconnectedness of people and resources, plus emphasis on personal growth (Elgin and Mitchell 1977:208). It is hoped that through voluntary simplicity a post-extravagant "wear it out and make it do" society will emerge and replace the "throwaway society" (Shane 1976:254).

Appropriate Technology. Appropriate technology is a term that usually refers to E. F. Schumacher's ideal of "technology that will employ lots of people, be gentle in its use of scarce resources, and serve the human person instead of making him the servant of machines" (Wakefield and Stafford 1977:72). Schumacher, a British economist, made the point in Small is Beautiful (Schumacher 1973) that "low" or "intermediate" technology is more appropriate than highly developed technologies, at least in some situations. These lower forms of technology have also been referred to as "self-help," "democratic," or "people's" technology. In these the use of indigenous materials and the minimal use of nonrenewable resources is important.

Technology is the base of our modern structure. If we hope to alter any part of the superstructure (laws, rules, taxes, welfare, education, health services, etc.) we must adjust this base to a level that is appropriate. Part of the current dilemma is that due to resource scarcity or allocation, the base of the structure has already been altered; we have altered the superstructure, unsure or unwilling to make the changes required by the modified input in the foundation.

Voluntary Simplicity Combined with Appropriate Technology. Current problems of our social system could be reduced by combining voluntary simplicity with appropriate technology to replace the larger, more complex social systems of today. Public opinion and reaction appear to support Elgin's and Bushnell's hypothesis that certain events occur as a social system grows to extreme levels of scale, complexity, and interdependence. Individuals are less able to understand the overall system; there are a resulting reduction of public participation in decision-making, a lowered accessibility to decision-makers, a disproportionate growth in costs of coordination and control, increased de-humanized interactions between people and the system, overall performance of the system declines, etc. (Elgin and Bushnell 1977:337). Examples range from university faculty meetings through city politics to meetings of the United Nations. The withering of the state espoused by Karl Marx has been replaced by the withering of public confidence in the doings of bureaucrats and politicians.

Although the idea of voluntary simplicity is commendable, perhaps the American public will never actually support such an effort on a large scale. But 1975 data gathered by pollster Louis Harris did report that:

> 92% of Americans are willing to eliminate annual model changes for automobiles;
> 91% are willing to forego meat for one day a week;
> 90% are willing to do away with annual fashion changes;
> 82% are willing to reduce the amount of advertising;
> 73% are willing to wear old clothes until they wear out.
>
> (Elgin and Mitchell 1977:209)

Anticipatory Democracy. There would seem to be a necessary counterpart to the combined forces of voluntary simplicity and appropriate technology, namely, anticipatory democracy. A bureaucratic view presents a society that is currently too complicated for the ordinary citizen's level of comprehension, and therefore the decision-making process ought to be entrusted to the political leaders who are advised by experts. On the other hand, a populist attitude of anti-intellectualism and anti-expertism holds that the experts and politicians have let the people down. Toffler suggests a compromise road in which decisions are neither too difficult nor too important for the public's involvements but rather one in which decisions are so important that the public along with the experts and the politicians needs to be involved. This new mode of planning involving the fusion of expertise and democratic social control has been labelled "anticipatory democracy" (Toffler 1970, 1976).

Anticipatory democracy is not just a vision of tomorrow but an experimental reality in a number of states. The oldest existing program is "California Tomorrow," initiated in 1961. Like successor programs, it strove for the education of participants, the generation of new information, the designing of alternative futures, as well as developing and communicating this consensus in the form of recommendations to policymakers (Baker 1976:262). Washington State's Governor Evans integrated material from his "The Alternatives for Washington" program in 20 of the 30 pieces of legislation that he recommended to the 1975 legislature (Baker 1976:265). Technology offers a number of ways to increase the input of individuals in their own government. Perhaps the most ambitious of these is the attempt to locate an electronic voting device in every dwelling so that any citizen who so desired could watch political debates, perhaps obtain air time, and certainly vote on each issue publicly debated.

Behavior and Life Styles

As we look specifically at behavior and future life styles, the key issue that affects every other dimension of life is the balance or imbalance between labor and free time. How hard one works to survive, what one receives from work, and how much freedom there is in free time are influential, if not determinative, factors in such matters as family relations, marriage, divorce, geographical and upward mobility, religious practices, educational growth, not to mention the amount of natural resources consumed or altered.

Primitive people apparently make little if any distinction between work and leisure (Kando 1975). Studies of Eskimo, American Indian, Central African, and Australian Aboriginal culture have shown that these intensely traditional cultures appear to do a great deal of playing even when searching for that one commodity without which their lives could not be sustained: food. An anthropologist who lived amidst a South American primitive tribe for two years said that translated into our terms, the primitives might be said to engage in what we would call "work behavior" for a maximum of 30 hours per week. Attendance at festivals and tribal activity seemed to have an obligatory character we might associate with mandatory faculty lunches or cocktail parties. At the same time, raising of crops, hunting or fishing had ritual or deliberately comic aspects to them that had nothing to do with the "business" at hand.

We have an image of our primitive forefathers working terribly hard, while we live in a comparative leisure society. It seems clear that while patricians of Greek and Roman society labored very little and enjoyed a leisure based upon the coerced labor of slaves, the general lot of people throughout recorded history has not been all that burdensome (DeGrazia, 1962). The first thing that civilization appears to embrace is the development of labor-saving devices, such as wheels, mills, and yokes. To compensate for the drudgery and harshness of labor, every primitive society appears to have celebrated ritual holidays with a fair amount of frequency. DeGrazia notes that in medieval society, as many as 180 of the days of the year were non-work days, because they were Sundays, religious holy days, or regional holidays. Medieval society exerted a minimal impact upon the environment. Could we reduce our environmental impacts similarly by reducing the productivity of goods and services and, like the middle ages, turn to less consumptive activities such as worship and festivals?

The celebrated work ethic seems to have had its birth in the Renaissance with fierce, competitive pride of civic craftsmen; its theological justification came with the writings of Luther, Calvin, and the counter-reformers of the sixteenth century, who saw in labor a safe way of serving God. Its economic credentials did not arrive until the eighteenth century with the development of industrialism. It is this heritage we have lived with for the past two centuries, and it is this "work-ethic" that has established the hegemony of Europe and America. It has proved difficult to impose that work ethic on Arabic, African, or Asian peoples. Britain's troubles lately have been assigned to the waning of the work-ethic, and one writer has even spoken of the British "revolution of falling expectations." Perhaps it is ecologically time that our work-ethic, which has translated into an ethic of "search out and destroy natural resources," should be replaced by an environmentally-oriented leisure ethic. What are the chances for such a leisure ethic?

As we have technologized our world, the conventional wisdom says we have decreased the number of hours necessary for work-to-earn-a-living and increased the amount of free time. In the sixties, it was fashionable to speak of the coming leisure boom: analysts of the counter-culture suggested that flower children would be pandemic in a society that no longer valued or needed work (Kando 1975). The cultural changes America underwent in the post-war years were tied to a supposed decrease in working hours, accompanied by an increase in hours of idleness, vacation, leisure time.

But the evidence of the Bureau of Labor Statistics does not support these supposed gains in leisure. The average work week for full-time workers was 48.4 hours in 1948, 39.6 hours in 1970, and 39.4 in 1978. If anything, the number of hours of fulltime people in the service sectors of the economy has been increasing in the decade of the seventies, with the average working week of white-collar workers adding up to 45.2 hours.

We have had a marked increase in the number of part-time workers—many are mothers who return to the labor pool—and we have had an increase in the number of three-day weekends, as well as in the number of annual vacation days. It is too early to know for sure the effects of postponing mandatory retirements to age 70, but preliminary reports from major companies indicate that the trend to early retirement has hardly stopped to draw a breath. Economic and global political changes of the coming decade will have more to do in establishing the average age of retirement than will Congressional legislation.

If anything, the changes that have occurred in the world affecting domestic finance have tended to increase the total number of hours worked per week per family. The biggest story in the labor market today is the increasing presence of women in both the career, professional markets and in the pink-collar arena. For many families, it is a matter of not being able to afford not being a two-career family. In some 40 percent of cases, the reason for the housewife returning to work was "to make ends meet." But the real issue here is not so much the maintaining of the high standard of living, as the pursuit of a standard of high living. American workers have sought increased work so as to be able to increase expenditures in leisure. Simply put, rather than accepting increased leisure time, the average American prefers to make more money so as to be able to spend more in the available hours of leisure. That trend may be coming to an end, as John Deere workers reject overtime in favor of protected and work-free Saturdays (Washington Post, front page, April 21, 1979).

Paradoxically, while work time is expanding, so is expenditure of time in leisure. In each year in the 1970s, Americans spent a larger percentage of their real income for leisure. Leisure spending zoomed from $60 billion in 1965 to $180 billion in 1978 (U.S. News and World Report, 1/15/79, p. 41). Rising costs seem not to have dimmed the conviction that vacations and recreation are an essential, deserved, and vital part of the good life. Some suggest that the boom in leisure spending is an attempt to compensate for the losses felt in political prestige or economic dominance.

While National Parks and National Forests claimed an average of one visit each for each American in 1977, the real increase in leisure time expenditures has been much closer to home. Television may take up to half the total leisure time of working families, the average adult watching television 17 hours per week, with some adults watching television more hours each week than they work, and some adolescents logging as much as 50 hours per week.

While leisure time—at least 70 percent of it—is spent in the home, in the past decade attendance at professional sports, theatre, symphony, horse and car racing, have all increased dramatically. The paradox is that Americans want and expect more money (for the same level of productivity) so that they can increase their expenditures on the good things in life. The cultural revolution needed here is simply the discovery, in the words of an old song, "that the best things in life are free."

At an earlier stage in American history, leisure was the force that not only bound the family together, but developed a sense of community and regional pride. Leisure, like work, has become intensely individualized today. Instead of coming together for cards, quilting bees, county fairs, church suppers, Americans now head off to their own private TV set, their solitary jogs, or a trip to the shopping mall, alone, or with one or two members of the family. The leisure revolution in America today is centered in the privatization of experience. Ninety-nine percent of homes have TV, and over 40 percent have two or more. Commercials have tried to convince us that watching one program while taping another is the best way to prevent family feuds.

Work has been the central life-focus for most Americans. This is most obvious among professionals—businessmen, doctors, teachers, lawyers, etc. But it has also been true for factory workers, plumbers, electricians, and truck drivers.

A majority of working Americans today indicate not only that they have some degree of job dissatisfaction, but also that their work is not their major life interest. For many people in the recent past, raising a family or being part of the family has been the central life interest, with working for that family being an inseparable part of that identity and commitment. What has happened in America in recent times is an unhappy combination of the weakening of family ties, a loss of sense of belonging to a particular job or career, and a failure of any other institution to assume the power that family, church, civic pride, employer once held for Americans.

Can changes in leisure effect that kind of cultural revolution that will bind a society together, in the face of sweeping changes in technology, politics, and economics? Can such changes in the societal superstructure compensate for changes in resource base and the technostructure?

The report of the Carnegie Commission on the future of public television, issued in January, 1979, offers the most sensationally optimistic hope that has been heard for a long, long time:

> Americans have the capacity to rebuild their local communities, their regions, and indeed their country, with tools no more formidable than transistors and television tubes. They need only to want to do so intensely enough to create a public telecommunications system that will bring it about. We remember the Egyptians for the pyramids and the Greeks for their graceful stone temples. How shall Americans be remembered? As exporters of sensationalism and salaciousness? Or as builders of magical electronic tabernacles that can in an instant erase the limitations of time and geography, and make us into one people?
>
> (Quoted in The Wall Street Journal, 2/2/79, p. 13, under the heading "Leisure and the Arts").

Television, more than any other medium, does make us one people, and, true to Aristotle's demand for a democracy, does enable all the citizenry to participate in public spectacles and public affairs. But, unlike the polis of Aristotle, our participation is comparatively solitary, without that challenge and excitement of personal contact, without that feeling that one person's presence can make a difference. Even holographic images are not the same as physical presences; a meeting by holographic TV will never have the same appeal as the tactile sensations provided by physical presence, nor will it present the same stimulus to on-the-spot change in thinking and proprioperceptions.

What technology has wrought in modern America is essentially the privatization of human experience. Perhaps the reason for the steady climb in the divorce rate is related to the changes in personality which occur to people because they are essentially private selves, while marriage is at least a union, if not a fusion, of two personalities. Such a union or fusion may have been easier to effect in traditional societies dominated by large families in which personal identity was largely interpersonal identity, when from an early age people learned to function as members of a group as well as responsible individuals.

Scenarios for Future Leisure Behavior

Three scenarios encompass the likely possibilities for future leisure behavior.

I. Cerebral-Autonomous. This scenario emphasizes the increasing privatization of personal experience. Other people will become less and less necessary. The home computer will do our shopping for us, the home entertainment center will provide a complete list of diversions from sports spectacles, to musical masterpieces, to magnificent travelogues (after all, who wants to travel to see areas of scenic beauty if they are always overcrowded; and besides, having only camera crews there decreases the environmental damage). Even the feelings of sexual gratification can be privatized, as those centers of the brain which are responsible for sexual pleasure can be stimulated at will by electronic devices. In this scenario, actual personal contact would be so minimized as to make a government legislate forms of procreation, lest the human race perish.

This paradigm represents unecological self-realization, for it deemphasizes the interrelatedness of people. It would likely be resource-intensive, for it would emphasize the subjugation of the physical environment to private human experience.

II. Sensate-Aesthetic. This scenario presumes a still greater use of technology to promote actual experiential behavior. Just as the transportation age has enabled people to travel to remote parts of the globe or to enjoy distant experiences, so all technology could put us in greater contact with our senses and with other human beings. As stereo reproduction has helped audiophiles to enjoy ever greater nuances of sound, and has in fact created rather remarkable communication networks, so work and leisure might be "re-tribalized," or "resensationalized," as people become aware of the feel of things, of the rewards of human contact, of the excellence of the finer human emotions.

Although this scenario would emphasize interpersonal human contact and physical quality of human experience, it is nevertheless unecological, for it would stress the utilization of materials to promote the scope and intensity of human experience.

III. Numinal-Social. In this scenario, we have something of a replay of the Aristotelian ideal of leisure as the cultivation of mind and spirit, coupled with the Platonic ideal of leisure as dialogical, as time for thoughtful conversation and inspiring human contact. The fulfillment of human potential in this scenario attempts to maximize the fullest use of the highest human faculties--thought and love--to encourage a life style in which refinement is based on education while interpersonal contacts are based on the kind of self-interest in which human beings are seen to be the greatest sources of human stimulation and human satisfaction.

This scenario combines the ethic of self-realization with the ecological ethic, for it emphasizes the human potential for intellectual and affective states and could be minimally consumptive of natural resources. Ancient Greek society reached a peak of human refinement and civilization, while consuming less than 3 percent per person of the energy consumed by modern "civilized" Americans.

Greek society offered a leisure ideal based on thought and personal contact. Medieval European culture, with its notion of the "community of saints," proposed a leisure ideal based on worship and mutual obligation. Modern culture has been much more confused in its presentation of leisure ideals. Perhaps this is because we are a pluralist culture and no one ideal can hope to persuade more than a significant minority of the people.

All three of these scenarios may come to pass. The real question is, which one will dominate? America seems adept at spawning a healthy abundance of leisure life styles. Entire leisure cultures have been built around mobile homes, backyard swimming pools, vacation homes, annual trips to New York City, Las Vegas, or other urban attractions. Camping has its own leisure culture, but the call of the sports contest is at least as strong as the call of the wild. Given the paraphernalia of sports equipment that decorates most American garages, one might determine we were the most outdoors-oriented culture in world history!

Each of these three scenarios may exert its influence upon each of us, at different stages of our lives. Perhaps the salvation of American culture lies in its very capacity to generate a great many life styles. After all, evolutionarily, those forms of life that proliferated most diversely enjoyed the highest survival rates. Instead of hoping for the exclusive predominance of any one life style, perhaps the idea is to maximize the potential of each respective, and respectable, life style. It is, of course, the hope of the authors of this paper that the best from each of these three scenarios may be actualized, and the third scenario have a much greater dominance than it currently enjoys.

Education

Which of the previously mentioned scenarios materializes will partially depend upon the type and manner of education that is and will be available in the future. Current world educational systems are inadequate in numbers, content, and methodology. Major changes will not occur unless the needed financial support results from assigning appropriate priority to education. In 1977 the world spent 7 percent less on education than on military expenditures (Futurist 1977a:397). During the next ten years these inadequate systems must somehow absorb an additional 250 million children (Sivard 1977).

Knowledge and service are reported as becoming the core activities of American society (McHale 1976). Fifty-five percent of the work force is already in the information business (Coates 1978). Traditional education may be too inflexible to meet the changing needs of American society. Private higher education is projected as playing less a role in the future due to escalating costs. By the year 2007, 89 percent (1,330) of privately supported institutions will have closed their doors or have been converted to public support. The surviving private institutions probably will be those that had a 1974 endowment that exceeded $3,700 per student (Pike 1977:373). Public higher education could have a student increase of 58 percent by the year 2007.

We may, of course, drastically reduce the numbers who go on to higher education. Currently, the greatest demand is in business and engineering programs, while liberal arts enrollments are lagging along behind. From the viewpoint of the third scenario, we might hope for an eventual increase in liberal arts programs, now recognized as civilizing pursuits.

Education should take on a broader meaning and be available in a variety of settings. It should provide a variety of mentors, arrange opportunities that make learning a lifelong process, and orient itself much more towards the future (Silvernail 1977:376). These changes suggest an emphasis on "learning how to learn" which appears more compatible with the future where "many jobs will become obsolete so quickly that no one will think in terms of career education but rather of a lifetime of multiple careers" (Abbott 1977:28). Many environmentalists have a future orientation; it would seem natural for many, if not most, environmental studies programs, whether in public schools, colleges, or graduate schools, to be in the vanguard of futures-oriented curricula.

The one drastic educational change that must occur across the board refers to the time orientation of education. All our "knowledge" and all our "experience" is of the past, and our education tends to reiterate the past. All stages of education must emphasize a futures orientation. The past must be seen not as an entity to be studied and dissected, but as a guide to the future. The authors of this paper propose an ethic that is ecological and self-realizational, set in the context of a culture that seeks the cultivation of the mind and spirit.

Conclusion

The next decades will certainly be ones of transition; the question is, what are we transiting towards? Some people have become pessimistic since their post-war desire for each year to be a "peak experience" (materially speaking) has not and cannot occur. Others have developed cautious optimism for humanity's impressive record of coping with previous problems, reforms due to increased social consciousness, improved ability to use science and technology more wisely, and from the recognition that past trends do not necessarily dictate human destiny (Silvernail 1978:375). Herman Kahn sees only two things that can keep the overall prospects of the world from being basically favorable: the possibility of nuclear war and the possibility of misunderstood technology (Kahn 1975:291).

Raymond Fletcher, a member of Britain's Parliament, commented that the alarming symptoms that are so frightening to people "may be birth symptoms instead of death symptoms" (Futurist 1976:107). While it is provocative to have scenarios for the future that paint disturbing pictures, it is imperative to have images of a golden age, for people may be moved to work to bring that about. Every human being stands in need of having an image of the future that he or she wishes to bring about; it is the task of the environmental educator to invent and propose images that are ecological, self-realizational, and promote the cultivation of the nobler, less materialistic, less consumptive aspects of the human personality.

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ENERGY, ENVIRONMENT AND SOCIAL CHANGE

Thomas Detwyler[1]

Abstract. *Crises of energy and environment are aggravated by corporate capitalism and ruling class domination. Obsession with short-term economic growth and private profits drives two types of positive feedback loop, identified here as the "business-as-usual" and "liberal" or "technofix" models. Transition to steady state (negative feedback dominance) is inevitable, but hazardous. Biotechnic recentralization and participatory socialism would cultivate a society that not only is sustainable, but also is agreeable and equitable. This entails fundamental political and economic changes. At present, corporate capitalism obstructs progress, causing environmental degradation and waste of energy; this is exemplified by the case of American ground transportation, and General Motors' role in it.*

PART 1. THE CURRENT CRISIS OF ENERGY, ENVIRONMENT AND SOCIETY

A. The Crisis System: Introduction

Today no one can seriously deny that humanity is enmeshed in a net of compounding crises. In America, widespread recognition of this "crisis system" dates only from the early 1970s. Until then attention was periodically focused on seemingly separate problems such as environmental contamination by pesticides (Carson 1962) and population growth (Ehrlich 1968). The Limits to Growth (Meadows, et al. 1972), despite disagreement over its methods and conclusions, stimulated awareness that humanity's problems are tightly interconnected, and, more importantly, that attempts to solve single problems may simply create greater problems elsewhere in the crisis system. Hence, an integrated or holistic or ecological approach to understanding and solving "a crisis" is recognized as necessary. Appropriately, some environmentalists now are striving to create a broader science of "ecology" which will embrace the totality of man's relations with his physical and living environment.

A notable feature of our attempts to deal with the crisis complex is the increased depth to which we are probing environmental issues and problems, in order to determine basic or fundamental or radical causes. Satisfaction with determining and treating proximate causes is giving way to a shattering disillusionment as "treatments" exacerbate problems rather than improve them.

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The deteriorating situation cannot help but spread and reinforce the view that economic and political values are root forces driving the crisis deeper. Of course in America, those who control the government and populace (i.e., the ruling class) profit most from the existing arrangement, and hence desire to keep basic causes hidden. The ruling class dominates public ideology, manipulating information to forestall and contain radical analysis (Domhoff, 1978, Chap. 5). The fact remains that basic solutions reside only in the obviation of basic causes, and this means that there must be structural change in our political-economic system.

This paper focuses on the energy and environmental threads of the crisis system--two of its most critical physical components. But the search for basic causes must go beyond the "sciences" of energy and environment to an exploration of the economics and politics of these subjects (fields that may be called "political energetics" and "political ecology"). This approach reveals that capitalist economics, especially in its present advanced form of corporate capitalism, is incapable of solving the energy and environmental crises. The heralded potential of capitalist economics to "internalize" costs of energy and environment, thus solving crises, is hollow. Focus on such technical "solutions" neglects energetic and environmental reality and also averts attention from values and practices that, although vital for survival, are inimical to the capitalist system (Edwards, et al. 1978; Odum and Odum 1976).

It should be emphasized that this paper is designed as a broad exploration with two major objectives: (1) to elucidate the above thesis concerning the dynamics and basic causes of the crisis system, and (2) to sketch the characteristics of an alternative, steady state society, and suggest processes for, and obstacles to, attaining them. Specifically, Part 1 describes the dynamics and some basic causes of the current crisis. Part 2 discusses the inevitability of transition to a steady-state society. Part 3 outlines characteristics of steady-state society, especially energy and environmental aspects. Part 4 discusses barriers to smooth transition, especially capitalistic political/economic institutions, using the example of ground transportation in America. Part 5 concludes with a very brief assessment of prospects and necessary processes for a smooth transition to an equitable, sustainable future.

The remainder of Part 1 briefly addresses these questions in turn: What are major characteristics of the crisis system, including its dynamics? What are the fundamental causes of the crisis system in America, including first social values and then the power mechanisms for exercising and reinforcing those values in the ecosystem? And finally, how do both conventional and liberal "solutions" tend to feed crisis?

B. Characteristics of the Crisis System

Some key characteristics of crisis system society are listed in Table 1. Such a society is also sometimes referred to as a hard technology society (J. and R. Clarke 1972) or as an energy-intensive society, because the features of technology and energy are so pertinent.

TABLE 1

Some Characteristics of Crisis System Society. (After Janine and Robin Clarke, 1972.)

Nature

1. Ecologically unsound
2. High pollution rate
3. Alienation from nature
4. Highly destructive to other species

Complexity and Scale

5. Positive (deviation amplifying) feedback dominates
6. Short-term view
7. Functional for limited time only
8. Centralist
9. City emphasis
10. World-wide trade
11. Small units highly dependent on others
12. Atomistic analysis predominates
13. High specialization
14. Singular solutions to technical and social problems
15. Operating modes too complicated for general comprehension

Science, Technology and Resources

16. Large energy input
17. Nonrenewable energy resources important
18. One-way use of materials
19. Mass production
20. Technical boundaries set by wealth
21. Technology liable to mis-use
22. Technological accidents frequent and/or serious
23. Science and technology alienated from culture
24. Science and technology performed by specialist elites
25. Science and technology divorced from other forms of knowledge
26. Curative "medicine"
27. Agricultural emphasis on monoculture
28. Food production specialized industry
29. Technical goals valid for only a small proportion of the globe for a finite time

Culture (including Work and Economy)

30. Growth-oriented economy
31. Narrow economic criteria predominate
32. Capital intensive
33. Quantity criteria highly valued
34. Emphasizes material production
35. Destructive of local culture
36. Innovation regulated by profit and war
37. Individual (private) satisfaction emphasized
38. Strong work/leisure distinction
39. High unemployment
40. Alienates young and old
41. Strongly competitive

Many of the cited characteristics are interdependent, even mutually reinforcing. A look at a key thread in the crisis system, energy, illustrates this point. The present energy path of the United States, based on increasing use of nuclear power and other high technology such as synthetic fuels, involves the following consequences for society (after Lovins, pp. 57-58 in Barney, 1977; numbers in parentheses denote characteristics in Table 1):

- A huge commitment of monetary capital (32) and energy capital (16, 17);
- A great concentration of economic and political power (8);
- Further concentration of industry in and near major cities (9);
- A need for central authority to impose big energy facilities and their perceived risks on people who want neither (15, 21, 23, 35);
- A tendency to make patterns of energy end-use conform to the needs of the source of supply rather than to people's needs (34, 36);
- Isolation and alienation of energy users from an unaccountable elite who supply, price, and regulate the energy (11, 20, 24);
- Reliance on a few adventurous high-technology devices whose technical and economic success is speculative (6, 14, 29, 31);
- Uncertainty about the ability of unproven safety systems to prevent catastrophic accidents (22); and
- Production of nuclear materials which, in the hands of terrorists, could result in mass destruction (21).

The interlocking of such characteristics is not accidental. Rather, it has arisen naturally during the development of the crisis system, the dynamics of which are considered next.

C. Dynamics of the Crisis System

System dynamics refers to the way in which a system behaves through time. Feedback, causal structure, and delays are the most important qualities of the crisis system. Systems analysis for forecasting should emphasize these qualities rather than dwell on regression analysis.

In simple terms, most existing social organizations and conventions were structured in a period when energy was available in apparently unlimited supplies and at insignificant prices. Material progress was facilitated by, indeed largely dependent upon, the conversion of ever greater amounts of energy (Cottrell 1955). For example, agricultural specialization and outer-dependence in the U.S. food system (advanced by agribusiness) has required vastly increased use of energy and material for packaging, freezing, transportation, etc.

As problems appeared, most commonly they were alleviated by applying more "progress"--that is, some energy-intensive technofix which was good for business all around. Such solutions depended on growth, especially growth in the use of resources, and on the exercise of other qualities listed in Table 1. For instance, in part to solve the problems of human movement in increasingly large and congested cities, automobile production and road construction were expanded.

1. Positive Feedback and "Solutions"

Feedback is the feeding back of part of the output of a system as input for another phase of operation. In a feedback loop the influence of an element comes back to itself through other elements. Two kinds of feedback loops can be recognized, positive and negative (e.g., Forrester 1969; Maruyama 1963; Meadows, *et al.* 1972; Detwyler and Marcus 1972).

Despite tremendous complexity, it is evident that the present crisis system is dominated by positive feedback. *Positive feedback* is the phenomenon commonly referred to as a "vicious circle," "compound interest," or, in the terminology of cybernetics, "deviation amplification." It should be noted that neither positive nor negative feedback implies goodness or badness. Positive feedback reinforces the main driving force, causing change to snow-ball. All deviation generated by a positive feedback loop is limited in degree or duration; that is, deviation cannot keep building indefinitely, and every positive feedback loop eventually is destroyed. Thus, all positive feedback loops are inherently unstable. Commonly, the loop collapses abruptly, but sometimes there is gradual emergence of dampening mechanisms and smoother transformation to an equilibrating, or negative, feedback loop.

Many of the crisis system qualities listed in Table 1 tend to reinforce each other through positive feedback processes. In a high-energy, high-technology, capitalist society two general kinds of positive feedback loops predominate.

a. The Conventional Widsom or Business-As-Usual Model

The first kind of positive feedback loop, Type 1, may also be called the "conventional wisdom" or "business-as-usual" model (see Figure 1A). In this model the dominant human actors are motivated mainly by short-term private profits and economic growth. That is, action is predicated primarily on qualities 30, growth-oriented economy, and 31, narrow economic criteria predominate, listed in Table 1. Environmental and social stress--initially dismissed as "economic externalities"--results and stimulates the treatment of stress symptoms with whatever has conventially worked. Treatment is limited to symptoms because the short-term view and the seeking of private profits nearly always preclude basic treatment. Upon treatment of the stress symptoms, the level of immediate stress declines, and the degree of concern about the problem also declines, leading to further problem-inducing actions of the initial sort (based on short-term profits and economic growth). In this vicious circle the short horizon and narrow economic criteria that guide the dominant actors stimulate the build-up of environmental and social crisis.

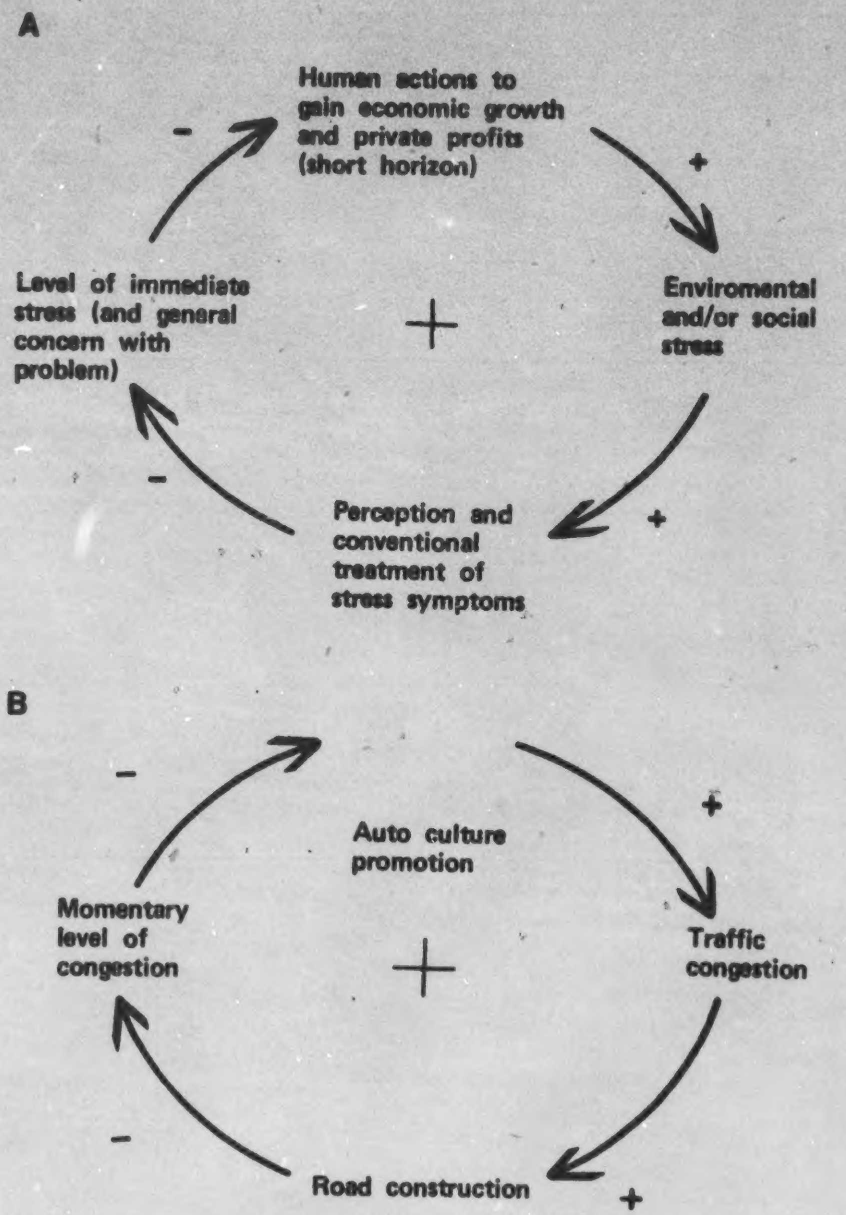

A
Human actions to gain economic growth and private profits (short horizon)
+
Enviromental and/or social stress
+
Perception and conventional treatment of stress symptoms
-
Level of immediate stress (and general concern with problem)
-
+
B
Auto culture promotion
+
Traffic congestion
+
Road construction
-
Momentary level of congestion
-
+

Figure 1.--Type 1 Positive Feedback Loops (the "Conventional Wisdom" or "Business-As-Usual" Model). A. General model. B. Automobile culture example.

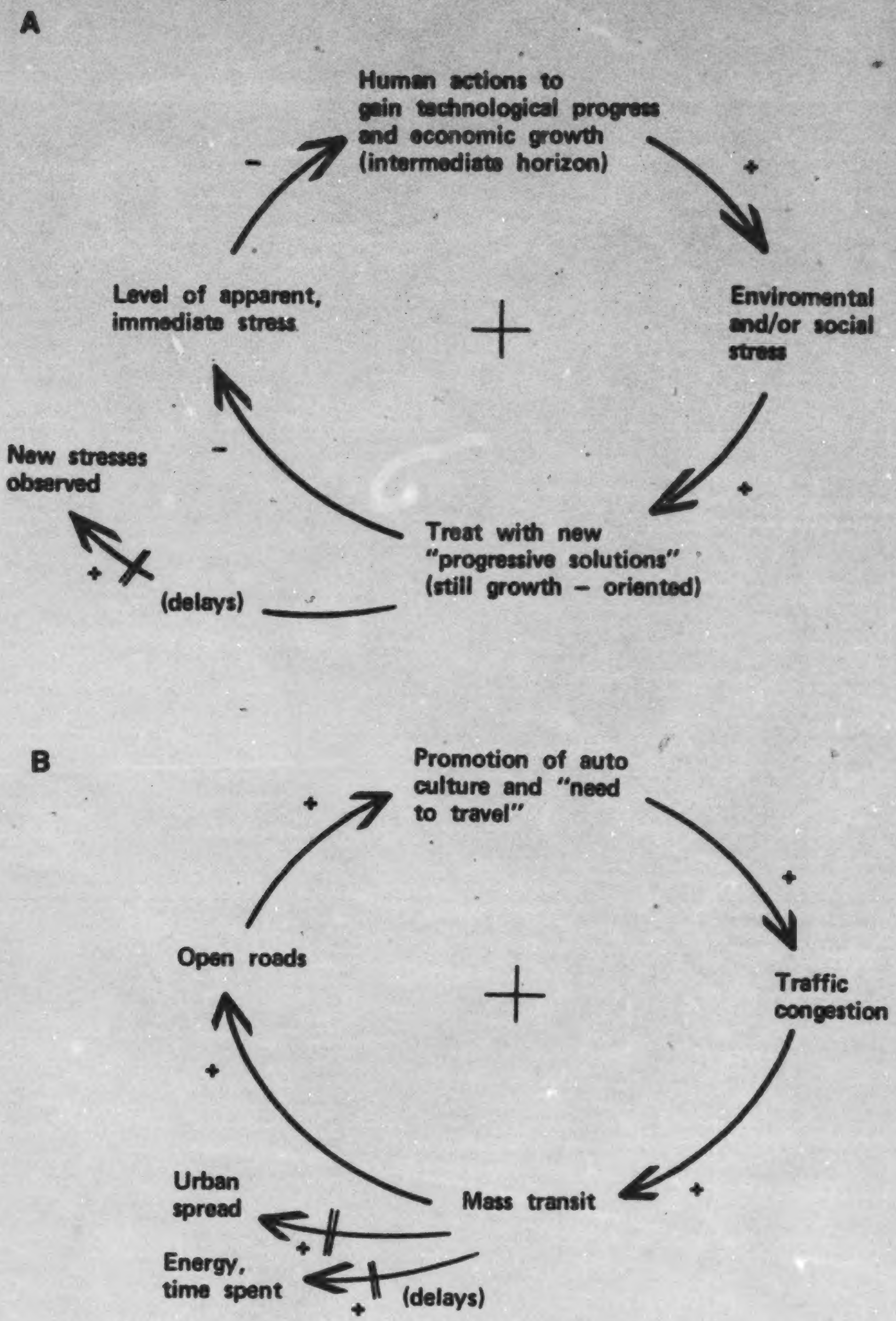
Today, the operation of this model exacerbates economic as well as social and environmental stress because, typically, the conventional treatments are energy and resource intensive.

A more specific example of the Type 1 model is shown in Figure 1B. It helps explain the runaway growth of automotive culture in America. In this case, business-as-usual has led to traffic congestion, for which the obvious treatment has been further road-building. This momentarily eases the level of congestion, thus allowing further growth of the auto culture. Despite a long list of serious ills produced by the auto culture--problems that generally have been intensifying over more than 50 years--the private, short-run, economic profiters from the auto culture have held sway. (The mechanisms by which such dominance is maintained are discussed in Part 4.) This example of business-as-usual positive feedback is widely recognized as the "What's good for General Motors is good for America" syndrome; however, the circle of major profiters/promoters should be more widely drawn to include Exxon, Firestone, Allstate, the Teamsters, and others.

b. The Liberal or Technofix Model

The second common variety of positive feedback loop, Type 2, is the "liberal" or "technofix" model (see Figure 2A). As in the Type 1 model, the dominant human actors usually are strongly motivated by economic growth and private profits, but here innovation, especially technological innovation, is an important value. Also, the liberal actor may have a somewhat longer-term and broader view of the world than does the business-as-usual actor. Still, considerations of economy override those of ecology and long-term equilibrium. In terms of the qualities listed in Table 1, number 20, technical boundaries set by wealth, and number 36, innovation regulated by profit and war, are important determinants of action. In this vicious circle, actions based on these values stimulate environmental and social stresses. But the liberal, sometimes seeing that conventional treatments do not work, proposes new "solutions." A new treatment may temporarily alleviate the targeted stresses, but, characteristically, it spawns further environmental and social stresses; commonly, if they are new stresses, there is some delay in recognizing them. This delay, together with the apparent reduction in the original kind of stress, feeds further liberal and technofix actions; thus, the positive feedback loop is closed, swelling both "progress" and new stresses.

Figure 2B offers a more specific example of the liberal or technofix model. Here again the auto culture produces traffic congestion, but in this instance (unlike the Type 1 model), the liberal actor might prescribe mass transit instead of simply more roads. Adoption of mass transit would open roads, thus perpetuating both the "need" to travel and the auto culture. Typically, the introduction is thought to reduce congestion, urban spread, total energy spent in transportation, and total time wasted in transit. However, in the slightly longer run, mass transit may well exacerbate such problems, for it provides an additional means, beside the automobile, of causing the above problems, which are associated with increased transportation per se. Here the liberal



A
Human actions to gain technological progress and economic growth (intermediate horizon)
+
Enviromental and/or social stress
+
Treat with new "progressive solutions" (still growth – oriented)
–
Level of apparent, immediate stress
–
+
New stresses observed
+
(delays)
B
Promotion of auto culture and "need to travel"
+
Traffic congestion
+
Mass transit
+
Open roads
+
+
Urban spread
+
Energy, time spent
+
(delays)

Figure 2.--Type 2 Positive Feedback Loops (the "Liberal" or "Technofix" Model). A. General model. B. Automobile culture example.

"solution" flies in the face of the fundamental solution, which is to reduce the need to travel. This basic solution is almost unthinkable because it is inconsonant with so many of the crisis system values (listed in Table 1); it especially contradicts the profit motive of the American transportation industry.

It is worth noting that the liberal model allows, even justifies, continuation of business-as-usual practices, albeit perhaps at reduced rates of growth. At the same time, a new approach is taken, new profits are earned, and "progress" is credited to the promoters. Thus, both the Type 1 and Type 2, taken either together or separately, serve the interests of the dominant class.

In contrast with the Type 1 loop, Type 2 feedback is qualitatively different--involving new treatments and new resulting stresses; disaster (at least of old, recognized sorts) is delayed. Because, as Lord Acton noted, small reforms are the enemies of great ones, the liberal model may delay but does not prevent disaster. Rather, it spreads and builds problems, many of new kinds, in the crisis system.

Debate in the United States about what solutions should be employed seldom transcends the limited options of the Types 1 and 2 models. Liberals will often disparage the "conservative's" conventional approach, and liberals will often argue among themselves about just which technofix is best. But a systems and feedback viewpoint helps reveal that the differences usually are trivial. The business-as-usual and liberal models are both condemned by their common features, which overwhelm their exaggerated differences. In today's world of ecological scarcity, both are oriented disastrously toward economic profits and growth, toward often useless production (instead of consumptive needs), toward technological innovation largely based on profits, toward huge energy and material inputs. In short, both models tend to depend on and perpetuate the qualities listed in Table 1. Systems dynamics helps us to see that both models are dominated by positive feedback and hence are unsustainable. The usual options, conventional and liberal alike, lead only to disaster.

As we shall see in Part 3, equilibrium (negative feedback) requires a change in the criteria for action that are used by the dominant actors. Specifically, a long-term ecological ethic must supplant the short-term, profit-maximizing and technofix perspectives that drive today's crisis system.

2. Shrinking Net Energy

In the past, energy-intensive practices generally were successful in solving at least temporarily the problems to which they were applied. But yesterday's solution has become today's problem. Without cheap, safe, and abundant energy, most of the proposed technological solutions to the problems of growth evaporate. Resource scarcity, together with factors inherent in corporate capitalism, have increased energy prices; and increased environmental loading, associated with high energy use, has reduced both environmental tolerance and the amount of work that

Nature does for "free" (Odum and Odum 1976). An example of the latter is the reduction by 10 percent of forest productivity in New England because of acid rain resulting from combustion of vast amounts of sulfurous fuels upwind from the region (Woodwell 1974). Thus, energy-intensive "solutions" constantly become more costly both economically and environmentally.

The use of high energy subsidies to "solve" our many problems has had its day. Tomorrow it becomes even less tenable. Finite is finite. Because of the net energy concept at work, our stock of usable energy is even less than commonly supposed.

The useful energy to be obtained from nonrenewable resources, such as fossil fuels and uranium, is subject to diminishing returns through time. It takes energy to get energy. And because we exploit the easiest-to-get energy resources first, each subsequent unit of gross energy (e.g., oil in the ground) requires greater energy subsidy to obtain than did the previous unit, thus leaving less net energy:

Gross Energy	-	Energy Subsidy	=	Net Energy
(*in situ* energy contained in resource)		(energy expended for exploration, extraction, processing, transportation, make-up from environmental losses, etc.)		(energy in useful form and place)

The tremendous growth of energy subsidy (per unit of either gross or net energy) is suggested by the historical trend in the average depth of oil wells in the United States: 300 feet in 1870, 1,000 feet in 1900, 3,000 feet in the 1920s, and more than 6,000 feet today. The cost of drilling oil and gas wells (which is largely a function of energy subsidy) rises exponentially with increasing depth (Cook, 1976, p. 121). Today, about half the petroleum produced in Texas is also consumed there as production-related subsidies, so that at best net energy is only half of gross energy (Ophuls, 1977, p. 114).

The dynamic of shrinking net energy means that the usefulness of gross energy reserves may be vastly overrated. In fact, a large portion of any given gross reserve will be energetically unexploitable, though perhaps technically extractable. Figure 3 illustrates this consequence; beyond the "resource cutoff" line, the system is an energy sink requiring more energy as subsidy than is returned as net energy. For nuclear fission reactors a net energy yield is doubtful if one considers all required energy subsidies (e.g., energy required for very long-term waste security; see Odum and Odum, 1976, p. 181). Net energy return is a critical question about many "alternative" energy systems, including those using oil shale, wind, and solar energy (*op. cit.*, Chap. 11).

The diminishing returns of net energy from fossil fuels and its larger social significance were recognized several decades ago by Fred Cottrell (1955, p. 117).

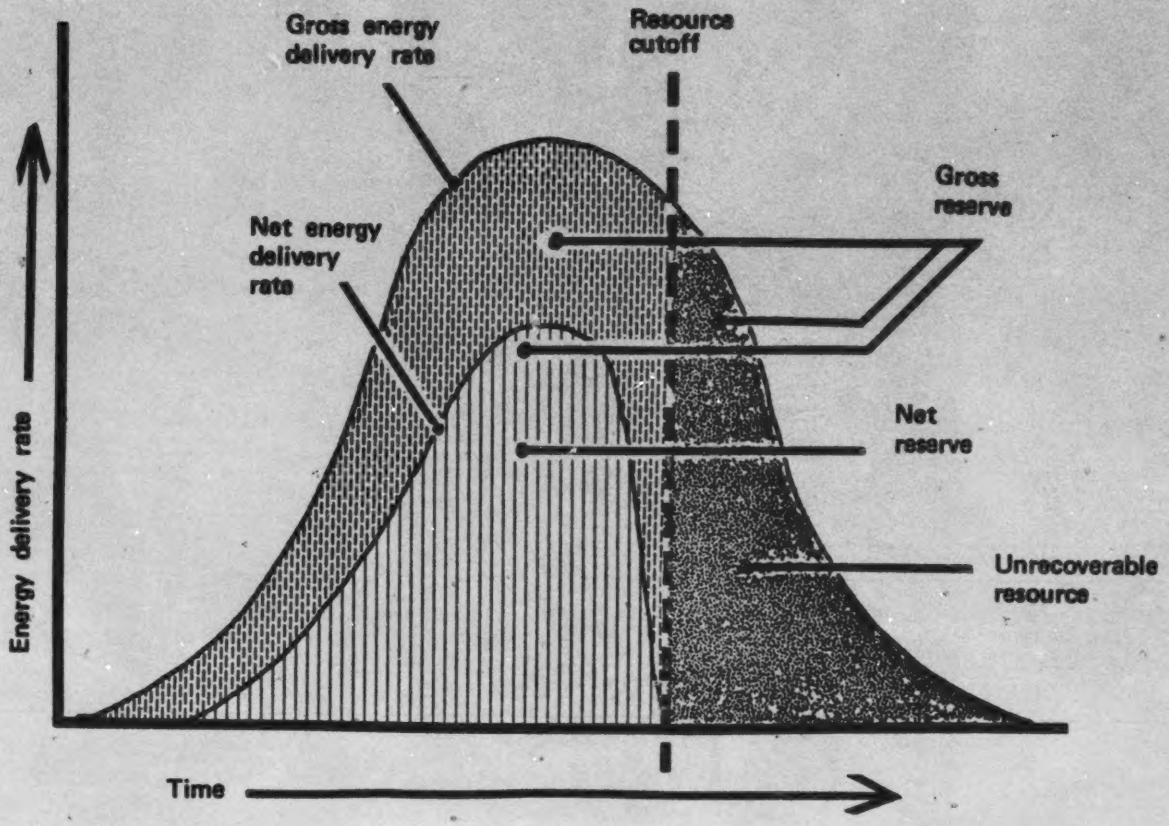

Gross energy delivery rate
Resource cutoff
Gross reserve
Net energy delivery rate
Net reserve
Unrecoverable resource
Energy delivery rate
Time

Figure 3.--Net Energy Delivery from a Finite Energy Resource. The difference between gross energy delivery rate and net energy delivery rate is the subsidy that is paid to develop the resource. (After Transition, a report prepared by the Office of Energy Research and Planning, Governor's Office, State of Oregon, 1975, p. 20.)

> One of the propositions on which the theory of the inevitability of technological progress rests is the idea that practically all the gains made by substituting high energy converters for organic ones can be used to accumulate more such converters, capable of converting more energy, to be diverted into still more converters.... It is clear that only that portion of the surplus energy secured can be diverted to increase the number of converters which is not required to overcome the costs arising out of the changes necessary to secure the increase. If these costs mount faster than surplus, regression is more likely than progress.

Throughout human history, until the past few centuries, culture was supported primarily by organic energy. The biological basis for life in the past is explained aptly by Odum and Odum (1976, p. 177):

> Systems of vegetation have already developed ways of maximizing the concentration of solar energy from its dilute source to organic matter.... For millions of years there has been natural selection for the best system of converting solar energy to chemical energy. The chain of biochemical machinery in plant photosynthesis has already been selected for maximum power.

As we shall see, organic converters are also the major energy basis for future societies.

Presently, the world's peoples convert energy at unprecedented rates (65.2×10^{15} kcal in 1971), and the great bulk of this energy (78.7 percent) is from nonrenewable sources (see Table 2). Great variation exists between countries in the average per capita amount of energy converted (see Table 3). Energy-intensive countries get larger proportions of their energy from nonrenewable sources than do lower-energy nations, making the former countries even more unstable than is suggested by overall energy consumption data.

The realities of the late 1970s reinforce and clarify Cottrell's 1955 views. William Ophuls (1977, p. 115) has presented one of the best summaries of today's energy situation, concluding:

> The era of cheap and abundant energy is decisively over. But energy is the linchpin of industrial civilization; as it becomes scarcer and more expensive, so must everything else. We have therefore come almost to the end of the industrial road characterized by grander high-energy solutions to the problems created by previous growth. Without the energy to back them up, such "solutions" have become merely fantastic. The only genuine solution is to begin a transition to a low-energy...civilization that depends primarily on flow resources like solar energy for the routine maintenance of life within the overall limitations on energy use that are built into the biosphere.

TABLE 2

World Consumption of Energy, 1971. (After Cook, 1976, p. 226.)

Nonrenewable Sources	Energy content (10^{15} kcal)	Percentage of Total
Crude oil	22.7	34.8
Coal and lignite	17.1	26.2
Natural gas	10.9	16.7
Uranium[b]	0.55	0.84
Geothermal power[c]	0.04	0.06
	51.30	78.70
Renewable Sources		
Plant food and feed[a]	6.2	9.5
Dried dung	3.3	5.1
Wood fuel	1.6	2.5
Vegetable refuse	1.6	2.5
Falling water	1.1	1.7
Fish	0.06	0.09
	13.90	21.30
	65.20	100.00%

[a] Does not include feed for draft animals.

[b] Calculated on basis of 17 percent system efficiency.

[c] Calculated on basis of 14 percent conversion efficiency.

TABLE 3

Average Per Capita Energy Conversion in Selected Countries, 1974. (From United Nations Statistical Yearbook, 1975; published 1976.)

Country	Kilocalories/day
U.S.A.	222,150
France	83,750
Japan	74,260
American Samoa	44,640
South America	16,330
China	12,220
Africa	6,940
India	3,890
Western Samoa	2,440

PART 2. THE TRANSITION IMPERATIVE

A. Limits to Crisis Growth

Our examination of positive feedback loops has revealed that such feedback both dominates the present crisis system and is inherently unsustainable. Further, we have seen how critical energy is in warding off, if not solving, problems. With each additional increment of growth other costs also rise inexorably: more materials (some of special and scarce kind), more pollution (or demands for controlling technofixes), more human resources. The limits to meeting such costs are ultimately grounded in the earth's physical limits.

But a mere enumeration of the kinds of limits and the problems presented by each fails to respect the interaction and interdependency between them. It is much more likely that the weight of the problems in concert will cause collapse of the crisis system long before the physical limits of any single factor are met. (Reductionism, rather than integrative study, is one of the disastrous emphases of the crisis system--Table 1, number 12--which should be avoided.) Ophuls (1977, p. 129) explains why:

> The combination of sectoral micro-problems creates an almost overwhelming macro-problem, while...the solutions to the macro-problem as well as most of the separate micro-problems depend on the questionable availability of a host of factors potentially in least supply. Thus the problems exacerbate each other.

The political and social limits to our managing Nature will probably prove more critical than Nature's limits. The downfall of the crisis system will most likely result from our inability to understand and cope with the full ensemble of problems and their interactions (see excellent discussion by Rufus Miles, Awakening From the American Dream, 1976).

The transition from growth to equilibrium is inevitable, not a matter of choice.

B. The Transition Phase

The hypothetical path of industrial civilization as it responds to various limitations is shown by the familiar S-curve (Figure 4; for further treatment see e.g., Meadows et al., 1972; Salk 1973). Ophuls succinctly describes the important changes in the curve and their major reasons (1977, p. 130):

> In the period A to B, the ecological and other resources are present in abundance (at least potentially) and...accelerating growth ensues, as it has during the last 300 years or more. However, eventually resources are no longer abundant enough to support further growth [acceleration].... At this point of inflection (C) deceleration begins; in the narrow transition zone (B to D)...considerable further growth occurs owing to momentum, but the ecological abundance that fueled accelerating growth begins to disappear; and...various negative feedback pressures...start to choke off further growth. Beyond the brief transition period these pressures build up quite rapidly, and deceleration continues until equilibrium (E) is attained.

The transition phase is most critical because in a brief time the basic dynamic switches from positive feedback to negative feedback or from acceleration to deceleration.

Crises should be expected during the transition phase, according to Jay Forrester (1973, p. 339):

> In all the social systems we have examined, from the simplest corporate subsystem to the most complex of world interactions, the greatest stresses and the greatest changes in social pressure come at the point where growth begins to slow down and equilibrium begins to be approached. It is during the transition period that turmoil is greatest.

We are now in the difficult phase of transition from growth to equilibrium. Our many crises attest to this fact--pollution and ecological degradation, urban ills, food and population crises, energy and resource scarcity, rampant inflation, and various social problems [e.g., alienation, mental illness, violence, cancer, etc.; see Brown (1978) for a good recent discussion of our global illnesses associated with the transition].

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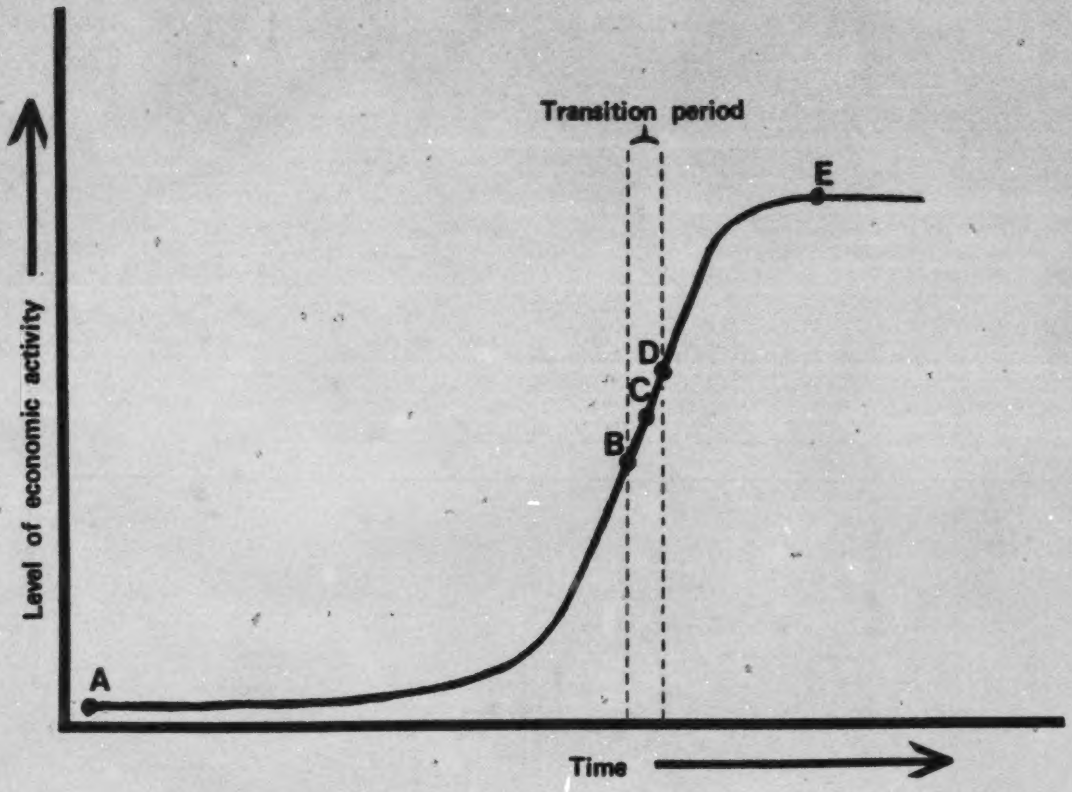
Transition period
E
D
C
B
A
Level of economic activity
Time

Figure 4.--Growth Curve of Industrial Civilization. (For explanation see text; after Ophuls, 1977, p. 130.)

C. Erosion of Future Options

Although equilibrium is inevitable, the type and level of steady state which we and Nature eventually attain is still open to some choice. But the sooner we adopt steady-state values, the greater will our (and succeeding generations') latitude in choosing specific futures (see Figure 5). Early and direct transition (I) may allow equilibrium at a high level of material affluence. Delaying the transition in favor of further growth will likely produce overshoot and a significantly lower level of equilibrium (II or III).

In order to facilitate a smooth transition, we must develop a goal, minimally identifying the major qualities and values of a steady state;

PART 3. BIOTECHNIC RECENTRALIZATION AND PARTICIPATORY SOCIALISM

Any equilibrium system of the future must be radically different from the present crisis system, for, by definition, a steady state must be dominated by equilibrating or negative feedback. The purpose of this part is to sketch some of the values and qualities, first physical and then political, that must be adopted if the future is to be agreeable and equitable as well as sustainable.

A. Physical Organization

Table 4 lists some characteristics of a steady state society that may aptly be termed "biotechnic society." (Both the term and notion come from work by Patrick Geddes, Lewis Mumford, Peter van Dresser, and Robin and Janine Clarke.) Essentially, a biotechnic society is one whose technics are both life-enhancing and largely based on biological resources. These two qualities require that human activities and settlements be decentralized (at least relative to today's extremely centralized arrangements; see van Dresser 1973). To avoid the connotation of extreme diffuseness, Peter van Dresser has used the term biotechnic recentralization, which more or less implies the physical and technical adjustments described in Table 4.

The energy basis for a biotechnic society dictates a high degree of decentralization. The use of flow (renewable) energy will predominate; this prominently includes solar radiation, wind, and self-organizing biological converters of solar energy (forests, agricultural fields, etc.). The dilute and diffuse nature of these energy resources makes decentralized settlement and energy-use practices far most efficient (if not always mandatory); the extreme material and geographical concentration of energy that exists today will be impossible (e.g., see van Dresser 1938; Mumford 1974; Odum and Odum 1976; Lovins 1976).

A more general scheme (than those characteristics given in Table 4), which if practiced would probably lead to much the same end as biotechnic recentralization, is "appropriate technology" as advocated by E. F. Schumacher during his last year (personal communication, 1977).

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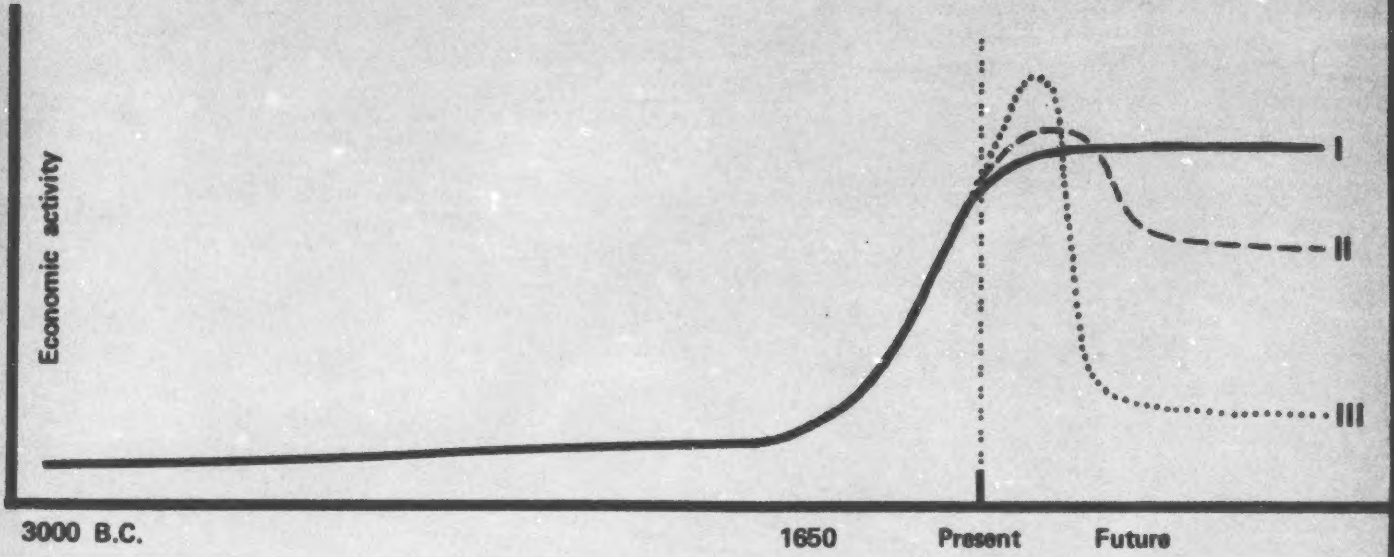

Figure 5.--World Economic and Ecological History. I: Direct transition to high-level steady state. II: Belated transition to lower-level steady state. III: Drastic overshoot with reversion to low-level equilibrium. (After Ophuls, 1977, p. 136.)

TABLE 4

Some Ideal Characteristics of a Biotechnic Society. (After Janine and Robin Clarke, 1972.)

Nature

1. Ecologically sound
2. Low or no pollution rate
3. Integration with nature
4. Dependent on well-being of other species

Complexity and Scale

5. Negative (steady state) feedback dominates
6. Long term view
7. Functional for long or all time
8. Decentralist
9. Village emphasis
10. Local and regional bartering
11. Small units largely self sufficient
12. Holistic (integrative) synthesis
13. Low specialization
14. Diverse solutions to technical and social problems
15. Operating modes understandable by everyone

Science, Technology and Resources

16. Small energy input
17. Flow (renewable) energy use dominant
18. Cyclic use of materials
19. Craft industry
20. Technical boundaries set by nature
21. Safeguards against technological mis-use
22. Technological accidents few and unimportant
23. Science and technology integrated with culture
24. Science and technology performed by all
25. Science and technology integrated with other forms of knowledge
26. Preventative "medicine"
27. Agricultural emphasis on diversity
28. Food production shared by all
29. Technical goals valid "for all people for all time"

Culture (incl. Work and Economy)

30. Steady-state economy
31. Ecological criteria predominate
32. Labor intensive
33. Quality criteria highly valued
34. Emphasizes consumptive needs
35. Compatible with local culture
36. Innovation regulated by need
37. Social satisfaction emphasized
38. Weak or non-existent work/leisure distinction
39. (Concept of employment/unemployment not valid)
40. Integrates young and old
41. Cooperative

He would judge the appropriateness of a technique for living by four criteria. First, does it help the poor (vs. merely enriching the wealthy)? Second, is it spiritually uplifting? Third, is it sound "naturally" (i.e., ecologically)? And fourth, does it entail sound use of resources, especially energy? Schumacher argued that we should not employ techniques except those for which all four questions could be answered affirmatively.

B. Political Organization

A biotechnic society, at least in theory, would have considerable latitude in its type of political organization. Most commonly, the inherent importance of decentralization in a biotechnic society has led the advocates of such a society to espouse cooperative anarchism as a political ideology (e.g., Peter Kropotkin). Other biotechnic advocates may not make their political ideals explicit, but their writings often contain a strong flavor of constructive anarchism (not to be misconstrued as nihilism) (e.g., John Ruskin, Mahatma Gandhi, Ralph Borsodi, Peter van Dresser, Murray Bookchin, E. F. Schumacher).

William Ophuls (1977, pp. 225-232) has indicated the necessary sociopolitical characteristics of any steady-state society, a list which repeats some qualities in Table 4 (e.g., diversity, communalism, holism) and adds others (e.g., authority and morality), some of which may conflict with biotechnic characteristics.

The importance of politics in aiding or obstructing development of a biotechnic society--a subject of Part 4 in this paper--argues for explicit political, not just technical and social, consideration.

While cooperative anarchism ideally is consonant with biotechnic practices, in the absence of universal altruism and in the face of ecological scarcity, broader collective consciousness and control is necessary. The anarchist model assumes a free economic market, albeit usually with a local emphasis, which is assumed to compel ecologically sound economic behavior. Contemporary capitalism is also market based, of course, but held less accountable for its ecological costs. But in either case, because the play of market forces and individualism produces the tragedy of the commons, market orientation will have to be abandoned. Ecology must engulf economics.

The "commons," from local to global scales, can only be protected from tragedy through the assured and continuing absence of a powerful exploiting class of persons. This is a political precondition for an equitable steady-state society; it certainly is not sufficient for achieving such a society. Ecological and humane values must predominate. Among the most significant changes would be material production to satisfy people's needs (rather than for profit) and a cooperative ethic recognizing people's responsibility to each other (rather than unequal and exploitative relations). Such a vision can be called socialism. Within the larger framework of agreement a desirable socialism would be democratic, decentralized, and include participatory control for the individual. A participatory socialist society would not magically remove all problems. But it could promote biotechnic recentralization while also providing a set of social institutions that encourage cooperative, egalitarian, and decent relations among people in contrast to capitalist organization, which fosters their opposites (see Edwards, Reich and Weisskopf, 1978, esp. Chap. 14).

C. Negative Feedback for Survival

In contrast to the build-up of crises in the crisis system through positive feedback loops, a biotechnic socialist approach would induce equilibrium through the dominance of negative feedback processes. This can be illustrated as a basic feedback loop shown in Figure 6A. This may be called the "equilibrating" or "steady state" or Type 3 model. In this model the dominant human actors are motivated by social responsibility and a goal of ecological integrity. Conscious and continued application of these values will help maintain a low level of environmental and social stress, despite some tendency for the reduced stress to feed back and weaken the social and ecological motivation. This is a sustainable, steady-state dynamic which acts to obviate crisis at its roots, fundamentally different from model Types 1 and 2 which ignore root causes and exacerbate crises.

Figure 6B shows a more specific example of the steady-state model. Decentralization exemplifies an ecologically sound and socially responsible action; such an action has many ramifications, including stimulus of many of the biotechnic qualities listed in Table 4, but the diagram focuses on the interaction of decentralization and three important qualities. Increased decentralization will stimulate reductions in energy expenditures for transport, in transport-generated pollution and traffic congestion. These changes in turn may weaken the impetus to decentralize further (as some problems of centralization are alleviated), but the overall effect is to stabilize the mentioned environmental problems.

In summary, there is an ecological imperative that humanity adopt modes of living close to those outlined here as biotechnic and recentralist. Further, contained within biotechnic recentralization there is a political imperative--that of participatory socialism--if the future is to be humanly fulfilling as well as ecologically sustained.

PART 4. THE CHIEF OBSTACLE: CORPORATE CAPITALISM AND RULING CLASS DOMINATION

A biotechnic and participatory ideal is alien to our existing American power system. Therefore the latter must be changed. Change in our physical power system depends on altering the distribution of power in our political economic system. In a remarkably perceptive essay entitled "Enough Energy for Life" (1974), Lewis Mumford succinctly summarizes the connection between the two, and prescribes a course of action.

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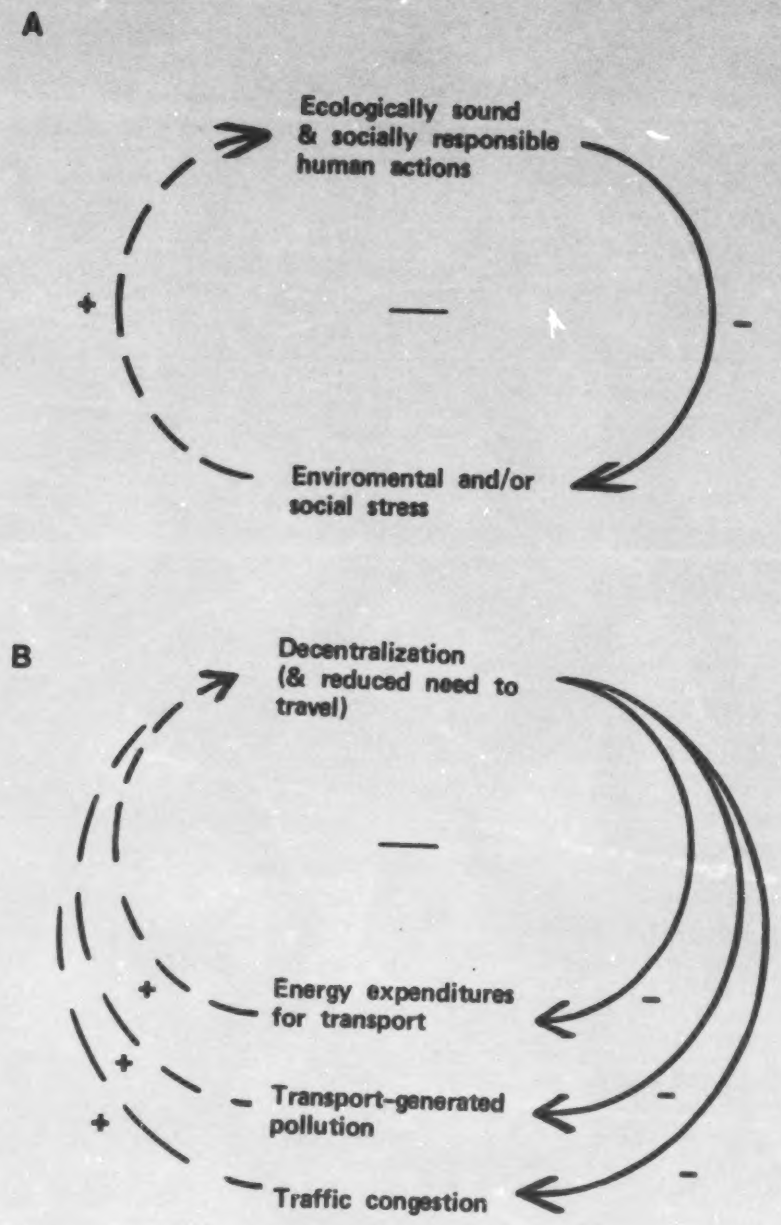
A
Ecologically sound & socially responsible human actions
+
—
-
Enviromental and/or social stress
B
Decentralization (& reduced need to travel)
—
+
Energy expenditures for transport
-
+
-
Transport-generated pollution
-
+
Traffic congestion
-

Figure 6.--Equilibrating or Steady State Feedback Loops (Type 3 Model). A. General model. B. Decentralization example.

> We shall not understand the real nature of the energy crisis unless we realize that it comes from the fact that our historic power systems, by their very concentration on quantitative expansion, indeed by their active hostility to organic limitations, have still no means of balancing production against consumption, or consumption against autonomous creativity. The key to having a sufficient supply of energy is to detach one productive process and function after another from the corporate power network, and restore them to the identifiable human communities capable of actively utilizing sun power and plant power, manpower and mind power, instead of surrendering all authority to machines, mechanical organizations, and electronic computers and in the end to their ultimate monitors and rulers, the Power Elite.

But the corporate power network actively opposes detachment, no matter how sensible, even necessary, it is.

Corporate capitalism and ruling class domination present a formidable obstacle to early smoothing of the transition. Corporate capitalism is defined as a political-economic system in which the means of production of wealth are privately owned and are dominated through relatively few corporations. A ruling class is a demarcated social class that has power over the government and underlying population within a given country (Domhoff 1978, p. 12). The power elite is the leadership group or operating arm of the ruling class, made up of active, working members of the ruling class and high-level employees in institutions controlled by members of the ruling class (op. cit., p. 13). Corporate capitalism is the political-economic structure, with its set of values and rules, within which the ruling class in America derives its power.

The large corporation is the chief instrument of economic power in the United States. In 1976 the nation's 450 top industrial firms controlled 70 percent of manufacturing assets and 79 percent of all profits (up from 50 and 59 percent, respectively, in 1960); the 100 biggest corporations held 58 percent of assets (Christian Science Monitor March 8, 1979, p. 4).

At its best, the corporation is a completely rational mechanism with a single overriding objective: the maximization of profits consonant with steady growth. This corporate rationality is wholly internal. Externally, it usually is at variance with social and ecological rationality.

Resource scarcity poses a threat to capitalism that appears to be ultimately irresolvable (Ophuls 1977; Gedicks 1977; Weisskopf, p. 407 in Edwards, et al. 1978). In the short term, as we saw in Part I, corporate actions in America may postpone crisis, while deepening it. In attempting to force continued economic growth in the face of shrinking net energy, it is predictable that the ruling class will further trample on a wide gamut of American ideals (e.g., American independence, egalitarianism at home and globally, representative government, full employment, universal human rights, Third World development, peacefulness; for an excellent discussion of capitalism's effects in these and other areas see Edwards, et al. 1978).

Of central concern here are the serious environmental degradation and extreme waste of energy resources encouraged by corporate capitalism. These workings are clearly seen in the case of ground transportation, and especially General Motors' role in it, in the United States.

A. Impacts of Ground Transport in America

First, it is useful to mention how ground transport, especially the automobile, impacts environment and energy. (Unless otherwise noted, the facts presented in the following two sections are from testimony presented by Bradford C. Snell to the U.S. Senate's Judiciary Subcommittee on Antitrust and Monopoly, "American Ground Transport...," 1974.)

1. Impact on Environment

Motor vehicle accidents kill some 50,000 Americans each year. Automobiles offer the highest risk (13.3 deaths per billion passenger miles in 1977); buses are tenfold safer, and passenger trains are 133 times safer (U.S. News & World Report October 9, 1978, p. 45).

Much urban land is lost, as 60 to 65 percent of urban land is given to motor vehicle use.

Congestion is another major impact, to the degree that by the early 1970s downtown traffic at rush hours traveled at 12 miles per hour (slower than in 1890!).

Transport-generated pollution is a serious problem. Annually, combustion of 42 billion gallons of fuel by motor vehicles within U.S. urban areas produces 60 million tons of toxic pollutants, which does $4 billion economic damage. In 1975 automobiles produced 79 percent of the carbon monoxide, 41 percent of the hydrocarbons, and 46 percent of the nitrogen oxides that foul the air in the United States (Environmental Quality, Sixth Annual Report of the Council on Environmental Quality, Washington, D.C., 1975).

Worsening environmental contamination from motor vehicles has not brought tighter pollution regulations recently, but just the opposite. In February 1979, the Environmental Protection Agency--ostensibly the nation's highest protector of society against environmental hazards--caved in to industry pressure and lowered the ozone standard to 0.12 parts per million from the 0.08 ppm which had been set in 1971. Thus, several cities previously in violation of ozone rules suddenly became technically clean. Ozone, which is an extremely toxic gas and a major component of smog, is formed in the atmosphere on sunny days through interaction of nitrogen oxides and certain organic compounds (Detwyler 1971, p. 86). In 1973, the EPA had warned that by as early as 1977 a cutback of up to 60 percent in automobile, truck, and diesel bus use might be compelled because of their exhaust emissions. Obviously, reducing air quality standards forestalls such measures, which would cut into the profits of the automobile, gasoline and tire corporations. The major losers are the young and old persons who are most susceptible to respiratory ailments; already in Los Angeles alone 500 persons die yearly of illness attributable to smog from motor vehicles.

2. Impact on Energy

Transportation accounts for the lion's share of energy use in the U.S. each year, between 40 and 50 percent. More than half of this (or about one-quarter of America's energy) is used directly as fuel. The rest is consumed indirectly in manufacturing and maintaining equipment, fuel refining, highway construction, insurance activities, etc. (Herendeen 1973).

This enormous consumption of energy largely results from the predominance of highly inefficient transport modes as well as the great amount of travel (see Tables 5 and 6). Automobiles provided 88.1 percent of intercity passenger miles in 1970, though they are only about one-third as efficient as buses and one-fourth as efficient as trains. These efficiencies are based only on fuel; indirect energies, if they were known, probably would yield even greater imbalances. Within the city, the situation is exaggerated further: automobiles provided 94 percent of passenger miles, but are only one-fifth as efficient as buses (and only 1/34 as efficient as bicycles). For transporting freight, trucks are less than one-fifth as efficient as railroads (Steinhart and Steinhart, 1974, pp. 223-224).

The trend has been for energetically *inefficient* modes to displace more efficient ones. For example, the percentage of urban passenger miles by mass transit fell from 31 in 1950, to 13 in 1960, to only 6 in 1970. Likewise, the railroads' share of freight transport dropped from 60 percent in 1940 to 40 percent in 1970 (*op. cit*.).

Less recognized has been the nearly total replacement of electric urban transit systems with gas or diesel-powered buses, and the dieselization of previously electric railroads--both causing great energetic and environmental losses.

B. General Motors' Control of Ground Transport

Such socially-deleterious changes in American ground transport were virtually imposed by several giant industrial corporations. In particular, three powerful automobile firms, led by General Motors, dominate all forms of ground transport through economic and political means. The history, manner, and some implications of control are detailed and substantiated by Snell (1974). A brief resumé is in order here.

Whatever the conscious intent of General Motors' directors and executives, the outgrowth of their economic power--exercised to maximize

TABLE 5

Direct Energy Use by Transport in U.S., 1972. (From U.S. Department of Transportation, *National Transportation Trends and Choices: To the Year 2000*, Washington, D.C.: U.S. Government Printing Office, 1977, p. 33.)

Mode	Percent of Transport Total
Auto[a]	56.61
Truck	14.54
Air[b]	7.84
Military	7.20
Gas Pipeline	4.30
Water	3.84
Rail	3.20
Oil Pipeline	1.64
Bus	0.63
Motorcycle	0.23
Total	100.00

[a] Includes personal use of light trucks.

[b] Includes general aviation.

Note: Energy consumption is measured in British thermal units (Btu). Total direct energy consumption by transport was 18,393 billion Btu in 1972, which represented approximately one-fourth of total national energy consumption. Total does not add due to rounding.

TABLE 6

Amount and Efficiency of Passenger Transport in the United States, 1970. (After Steinhart and Steinhart 1974, p. 223.)

	Mode	Passenger Miles x 10^9	Percentage of Total Passenger Miles	Energy Consumed (kcal x 10^{12})	Efficiency (kcal/ Passenger Mile
Intercity	Automobiles	1020	88.1	940	920
	Airplanes	104	9.0	306	2940
	Buses	25	2.2	7.6	308
	Railroads	8	0.7	1.9	240
Intracity	Automobile	739	94	1130	1530
	Mass Transit (almost all bus)	49.5	6	14.8	300
	Bicycle	--	--	--	45

profits and promote corporate growth--has been to replace with automobiles other, more efficient and ecologically-sound kinds of travel. Simply put, there is greater profit in 35 passenger cars than in one bus, there is greater profit in 50 automobiles than in one streetcar, subway or rail transit vehicle, there is greater profit in 1,000 cars or 150 trucks than in one train.

Economic power in the transport industry is basically a function of concentration and size. Ninety-seven percent of automobile production and 84 percent of truck production are concentrated in the Big Three auto companies (GM, Ford and Chrysler). Diversified General Motors singly dominates the bus and rail locomotive industries, accounting for 75 percent of city bus production, 100 percent of passenger locomotives and 80 percent of all freight engines that are domestically built.

As for size, the Big Three's combined sales of motor vehicles and parts exceeded $50 billion yearly in early 1970s, which was more than 25 times the aggregate sales of buses, trains, subway and rapid transit cars by the next four largest companies. In the latest year of record, 1977, General Motors' net sales of $54.96 billion made it the world's largest corporation; in this and other categories GM set all-time company records, including net income of $3.3 billion, sales of automotive products in the U.S. of $44.3 billion, number of U.S.-made cars and trucks sold (6,695,000), and world total unit sales of 9,068,000 (Moody's Industrial Manual, 1978, pp. 672-673).

This structure of collective monopoly has had numerous results, including most importantly the decline of nonautomotive transport, some forms of which are cheaper, more efficient, and cleaner.

1. Forced Growth of Automotive Transport

In 1925 GM bought the United States' biggest maker of buses, Yellow Coach. In 1926 GM helped form and then combined with Greyhound Corporation to begin replacing intercity rail passenger service with bus transportation. (GM was the largest shareholder in Greyhound until 1948.)

To create sales for its city buses, GM began in 1932 to establish holding companies whose purpose it was to buy electric streetcar firms, convert them to GM motorbus operation, and then resell them to local transit companies under contracts prohibiting electric propulsion. National City Lines, for example, was established in 1936 by GM with Standard Oil of California and Firestone Tire; with its affiliates this holding company converted electric transit systems in 16 states to GM bus operations. By this method the $100 million electric rail system in and around Los Angeles was largely scrapped in favor of diesel buses (and ultimately cars). By 1949 GM buses had replaced 100 electric transit systems in 45 American cities. For criminal conspiracy in such replacement a federal court fined GM $5,000 and its treasurer one dollar in 1949.

The long-term effect of dieselizing the urban transit systems has been to sell more automobiles, for the noise, smoke and slowness of diesel buses have discouraged ridership. Further, compared with electric buses the diesels have 28 percent shorter economic lives and 40 percent higher operating costs, as well as the substantial energy and environmental costs cited previously. But GM's gross revenues are 10 times greater if it sells cars instead of buses, so internal corporate rationality has prevailed.

General Motors diversified into railroads in 1930 by acquiring Winton Engine (the largest manufacturer of heavy diesel engines) and Electro-Motive; this instantly made GM the country's largest maker of train locomotives. Compared with an electric locomotive, a diesel one cost three times more, did one-third the work, and lasted one-half as long. Consistent with profit maximization, GM proceeded to dieselize railroad transportation. It did this by using its freight business--GM was the nation's largest shipper from 1935 through 1970--to coerce the railroads to buy GM diesel locomotives. In 1935 electric units outnumbered diesels 7 to 1 and GM had only 2.4 percent of industry sales; by 1970 diesels outnumbered electric units 100 to 1 and GM made 80 percent of the diesel locomotives. Diselization impaired trains' ability to compete with cars and trucks for both passengers and freight, and has left America with a second-rate railway system. But again, GM gross revenues were larger, by 25 to 35 times, if it could sell cars and trucks instead of train locomotives, so internal corporate rationality again prevailed at great public expense.

The multinational operations of the Big Three have sometimes conflicted with American interests beyond economy, energy and environment. Noteworthy are the actions of GM and Ford during World War II when they served the interests of their major stockholders and maximized profits by supplying not only the Allies, but also the Nazis, with war materiel. For example, during the heart of the war, in 1943, GM and Ford subsidiaries in Germany built more than 70 percent of the Reich's medium and heavy-duty trucks and almost 90 percent of the "mule" 3-ton armored half-tracks, together "the backbone of the German army transportation system" (according to American intelligence statements; Snell, 1974, pp. 22 and 84). From 1939 through 1945, GM's Russelsheim factory assembled half of the propulsion systems for the Luftwaffe's most important bomber, the JU-88; they also produced, in 1944, engines for the world's first operational jet fighter (op. cit., pp. 18 and 84).

2. GM's Influence Beyond Economics

General Motors uses its monopoly muscle-power beyond the economic ways that have been mentioned, actively pushing its interests in political and other arenas. In a recent study of ruling class domination in America, William Domhoff (1978) documented four major processes by which control generally is exerted: the special interest process, the policy-formation process, the candidate-selection process, and the ideology process. GM has pursued all four processes to expand the interests of its owners and to dominate American ground travel. Only several instances may be mentioned here.

Shared monopoly profits give the Big Three extraordinary ability to finance lobbying and other political activities. According to the Federal Trade Commission, American consumers in 1972 paid more than $3 billion in monopoly overcharges to the Big Three for automobiles and replacement parts made by them (Snell, 1974, p. 13). Each year the Big Three contributes about $14 million to trade groups which lobby for automotive transport, in contrast to the less than $1 million provided to rail transit lobbies by the Big Three's four leading rivals (op. cit., 1974, p. 27). Also, as of 1973 General Motors was an influential and contributing member of the major rivals to the highway lobby: the American Transit Association, the Railway Progress Institute, and the Institute for Rapid Transit (op. cit., p. 46). But the power of these organizations is dwarfed by that of groups interested in more highways and less rail transit, such as the Highway Users Federation for Safety and Mobility (HUFSAM) and the Motor Vehicle Manufacturers Association (MVMA). The latter two groups fight the diversion of funds from highways to rail transit with a combined yearly budget of about $16 million, most of it contributed by the Big Three. Estimates of the amount spent altogether by the automobile, oil, tire and other interested industries on highway lobbying ranges from $100 million to $500 million annually (op. cit., pp. 45 and 95). Highways have been promoted and financed by a self-perpetuating fund--state and local gasoline taxes--which is legally unavailable for any other purpose in 45 of the 50 states (op. cit., pp. 44-45 and 94). From 1945 through 1970, states and localities spent more than $156 billion on roads; from 1956 through 1970 the U.S. government spent about $70 billion for highways (op. cit., p. 45).

Campaign contributions are another key means for maintaining the auto culture. Many members of congressional committees dealing with highway legislation received sizable contributions from the highway lobby groups, and such groups have paid as much as $5,000 to key members of Congress to address their meetings (op. cit., p. 94).

Thus, it is seen how economic and political power is exercised to maintain the vicious circles involving the auto culture which were described in Part 1, especially "business-as-usual" loops, even in the face of many tendencies promoting alternative and saner transport modes (the Type 2, liberal, solutions). Such basic solutions as decentralization and reduced need to travel, obviously are heretical to the ruling class.

C. Corporate Obstacles to the Energy Transition

American energy resources, like ground transport, are dominated by a few corporations, though the degree of corporate concentration in the energy industry is somewhat less. The kinds and amounts of energy that society uses are determined in considerable part by what will maximize profits for the dominant energy corporations and their owners.

As in the case of transport, corporate dominance in energy affairs is exerted through political as well as economic means. Norman Medvin and others (1975) have detailed the extent and effectiveness of such processes as the "revolving door interlock," by which a government official retires to the energy industry and is succeeded in government by someone else from the industry. Regulatory commissions as well as the bureaucracy are stacked with energy industry shills. Documented contributions made by the oil industry alone to the reelection campaign of Richard Nixon and the Republican Party in 1972 amounted to at least $5.5 million--about one-tenth of the total collected by the Republican fund-raising committees (op. cit., p. 31). Of this amount, $1.2 million was contributed by members of the National Petroleum Council, which is the senior advisory body to the Interior Department on oil policy (op. cit., p. 33). Full-time oil lobbyists and other oil representatives in Washington during the early 1970s numbered more than 400, with a probable payroll of more than $10 million per year (Freeman, 1974, p. 179). Ironically, the energy industry deducts lobbying expenditures as a legitimate business expense, with the taxpayer footing the bill, but environmental or consumer groups cannot obtain income tax deductions for the donors of the money they spend.

The world petroleum cartel known as the Seven Sisters is largely home grown, with five of the corporations being American-based. By working together, the major producers and purveyors of oil can profit by limiting output. The demand for oil is inelastic, being built into our transportation system, settlement patterns, materialistic life style and so forth. Declared profits for the period 1972 to 1977 increased by 98 percent for Gulf, 75 percent of Exxon, 67 percent for Mobil, 86 percent for Standard Oil of California, etc. (Ulmer, 1978, p. 31).

Excess profits, derived in part from the actions of OPEC, are used to perpetuate the stranglehold of the oil companies on society, including by their move to control competing fuels like natural gas, coal and uranium--and now synthetic fuels.

Horizontally integrated corporations now dominate the energy industry. For consumers switching away from oil and natural gas, Exxon, Gulf, Continental, or Occidental Petroleum will happily sell coal (through their respective subsidiaries, Monterey Coal, Pittsburgh & Midway Coal, Consolidation Coal, and Island Creek Coal; Forbes Magazine, November 15, 1972, p. 41). The companies spread their interests into other energy sectors in the 1960s. By 1970, of the 25 largest U.S. oil companies, 18 were involved in uranium mining or research (e.g., Kerr-McGee controlled 23 percent of uranium milling), 18 had interests in oil shale, and 11 owned coal firms (Ridgeway, 1970, p. 126).

Members of the Seven Sisters own or lease at least 47 percent of U.S. uranium ore reserves, 41 percent of uranium milling capacity, and 12 percent of known coal reserves (Ulmer, 1978, p. 32).

The controllers of these conventional but nonrenewable sources of energy have effectively gained favored treatment, with more than $200 billion worth of tax breaks and hidden subsidies since World War II (according to Battelle Laboratories' estimates, in Christian Science Monitor, February 20, 1979, p. 3). Profits and subsidies are used, subtly and overtly, to promote further demand of profitable kinds of energy (e.g., Mobil's continuing series of advertisements in newspapers and magazines). As with automotive transport, it is hence no wonder that the public is ignorant or skeptical of equilibrium alternatives. The corporations have invested much in the conventional energy resources, and they profit greatly from their evolved control. Solar energy and its derivatives present a grave threat to centralists and the ruling class, though they are groping for ways to control even the sun (Keyes 1975).

D. The Probable Path

Of course, the ruling class fails to acknowledge the inherent destructiveness of corporate capitalism, preferring to invoke technical reasons for why the market does not safeguard the environment and scarce resources. For example, a 1977 task force report sponsored by the Rockefeller Brothers Fund (The Unfinished Agenda) cites as reasons, "obstructions to operation of the market, an inability of the market to look far enough ahead, and some serious flaws in present economic theory" (Barney, 1977, p. 146). Implicitly, the major challenge appears to be how to preserve corporate capitalism and ruling class privileges. Explicitly, however, this is stated as follows:

> *A major challenge for the next decade will be to find means of using the market, including its imperfections, to induce environmentally beneficial behavior. In other words, ways must be found to curb economically profitable practices that are destructive to the environment, while still preserving the meritorious aspects of free enterprise* (op. cit., p. 146).

This appears to be structurally impossible, given the goals and power of the dominant corporations and the power elite.

In summary, corporate capitalism and ruling class domination present a formidable obstacle to early smoothing of the transition.

How then is American society likely to evolve? With shrinking net energy, resource scarcity, and the end of economic growth, the struggle between ruling class and populace heightens, as does the struggle between America and the world's less developed countries. The latter groups are being forced to take the brunt of lower living standards (as measured by material consumption). Public ideology will continue to be manipulated in an attempt to achieve acquiescence. But in the absence of fundamental constructive changes, crisis will deepen. Presumably the basic causes, prominently including corporate capitalism, will become transparent; then enlightened challenges will mount and mere ideological control will become insufficient to maintain ruling class privilege. In that period there is likelihood of more overt and forceful control, with imposition of a fascist or corporate state.

PART 5. SOME RAYS OF HOPE

Some evidence suggests that such a scenario can be averted and that the transition can be smoothed to achieve a future that is sustainable, desirable and equitable.

The rays of hope include these five:

(1) The fundamental problem is social/political and hence clearly is subject to human solution.

(2) Adequate scientific and technical knowledge already exists; what is needed now is intelligent, integrated application.

(3) Many physical aspects can be initiated by relatively small groups without having to move massive organizations.

(4) There exist in America the rudiments of an appropriate movement--people learning about and practicing elements that are essential for the future; they can build upon thin but valuable traditions contributive to biotechnic recentralization and participatory socialism.

(5) There are fruitful examples of constructive change abroad, among socialist countries and areas where supranational ruling class influence has been effectively countered by localism or nationalism.

Practical suggestions for facilitating a smooth transition include education about our situation and options, effective advocacy of the required basic changes, and exemplary (i.e., equilibrium-inducing) personal and group action.

Ultimately, constructive social change requires appropriate politicization of the populace. Broad and fundamental understanding and action can only occur--and inevitably will occur--as the crisis system manifests itself further, heightening the contradiction between "what is" and "what should be."

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CONVENTIONAL OR "SOFT" ENERGY FUTURES: CONTRASTS AND EDUCATIONAL NEEDS

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Abstract. *Growth of our American society has been based on readily available, low-cost, but finite sources of energy. We now face a need to transfer dependence to emphasize renewable alternatives. This does not eliminate environmental concerns, though it substantially changes their nature. Education for this future must cross traditional disciplinary boundaries to be effective, while sacrificing a minimum of disciplinary depth.*

Introduction

The past decade has witnessed mushrooming growth in concern for the environment and energy-related issues, followed by a leveling of concern. Our history--the growth of our affluent society--has been based on rich energy resources: readily available, low cost, and exploited carelessly. Our attitude is typified by dependence for electricity on large, high technology, central facilities and projections of ever-growing "demand." These technologies depend on a rapidly diminishing resource base. In contrast, recent assessments have portrayed an alternative "soft" path, such as use of distributed solar or biomass sources. These are said to be environmentally benign, to depend more on renewable resources, and to be more readily controlled by groups they serve than are massive installations tied to a remote resource base.

To what extent should we now transfer dependence from oil to other fossil sources, or to emerging "soft" approaches? Conversion to other fossil fuels may involve high costs and serious environmental impacts. Impacts of distributed, "soft" technologies are believed minimal, but we lack experience with use of such technologies at a suitable scale. Thus, our belief is based on incomplete evaluation; a weak foundation from which to construct a societal future.

This paper addresses environment- and resource-based problems of meeting society's energy needs by these opposite approaches. To satisfy every reader would require extensive, balanced review of every option. Brevity precludes this. Coverage is limited to very brief statements for some options and a somewhat fuller discussion of several examples the author finds particularly informative. Review content is based on very recent literature and on professional studies shared by UCLA students.

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There appear to be significant environmental concerns with all alternatives including those considered benign, though level and kind of concern vary widely. In the opinion of this author, such emerging knowledge and realistic appraisal of future energy alternatives provide the best source material for environmental educators.

The Conventional Energy Resource Picture: Petroleum Liquids

A recent paper by Hayes (1979) gives a comprehensive, balanced picture of the present and probable future energy resource base. For petroleum liquids, the current view is close to early projections by Hubbert (1974). The classic view of the economist is that oil can always be found if the price is right. But resource scientists know that at some stage further search is of limited value, and perhaps pointless: declining grade and institutional constraints are such that no effort will likely provide a net resource increase. Data on U.S. petroleum liquids and proved reserves clearly illustrate the current situation (Table 1). We have moved in a very short time from self-sufficiency, past a peak availability, to critical dependence on imports; from discovering more than we produce and use to a rate only a fraction of consumption. Worldwide, the picture is similar though at an earlier stage of exploitation.

Table 1

U.S. Liquid Petroleum Supplies and Reserves, 1940 to 2000

Year	Domestic Supplies*	Imported Supplies*	Proved Reserves**	Production**
1940	7.5			
1950	13.5		25.3	1.94
1960	16.8	3.3	31.6	2.47
1970	22.8	6.7	39.0	3.32
1977	20.0	17.4	29.5	2.86
1985	17	22		
2000	15	17		

* From Hayes (1979), in quads (10^{15} Btu) per year (10^{15} Btu is approximately equivalent to 10^{12} cubic feet of natural gas, 170 x 10^6 barrels of oil, 40 x 10^6 tons of coal, or 10^{11} kilowatt hours of electricity).

** From American Gas Association, et al. (1978), in billions of barrels.

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Of course, no single view is shared by all. Odell (1978), an economist, is much more optimistic. He notes that the "real" price of oil declined from $4.25 per barrel in 1950 to a low $1.60 in 1970. The "crunch" of 1973-74 led to an instant high (maintained through February, 1979) of about $9.25. He also notes that real higher prices and perception of future escalation have led to slowing or cessation of growth in much non-U.S. demand. As a result, he foresees lower future growth rates, such as 3 percent per year compared with past expectations of 7 percent or more. He further notes that some foresee a liquid petroleum resource base perhaps five times the "conventional" 2000 billion barrels which conservative wisdom predicts. The differences are critically important. The lower growth and larger resource base push the expected peak on the production curve back from perhaps 1990 to the year 2020. If this were to happen, apparent need for immediate development of alternates would disappear. Odell properly notes also the severe problems of readjustment and costs of any change away from our oil-based energy economy in less than about three generations. His view is hopeful, particularly with regard to avoiding major disruptions.

Discoveries of oil in Mexico appear to support optimism. And certainly, the potential is larger than once thought (Stewart-Gordon 1979). Recent discoveries (onshore Reforma area and offshore Campeche Sound) have increased reserves to about 26 billion barrels. There are some claims of a "potential" 200 billion barrel resource. However, the serious analyst notes that this includes hoped-for recovery from areas such as the Chicontepec basins, geologically a sequence of sands and shales, with sand members unlikely to be either thick or large in area. Oil may indeed be there, but recovery is likely to be slow, expensive and limited.

Of the oil we discover, about two-thirds remains in the ground after all efforts at recovery. Research started on recovery of this unused resource about 30 years ago. After about 10 years of vigorous activity, however, cheaper imports led to dwindling interest. The 1973-74 "crunch" turned this situation around. Quiescent research was fed fresh resources and boomed. But can technology turn around "wasteful" practices? A study for the U.S. Congress, Office of Technology Assessment (in which this author was involved from conception to completion), provides an answer (U.S. Congress 1978). Technology is understood and available, but recovery is slow, technically difficult, and expensive. Such processes could combine to provide an added near 50 billion barrels at a price of $30 per barrel or less (compared with same-basis conventional oil prices of $13.75 and alternate fuels prices of $22.00 per barrel). Net energy gained would probably be less than half the gross resource consumed. New petroleum technology will only ameliorate our problem of a shrinking resource base, not solve it.

Other Conventional Sources

There are other fossil fuels in addition to oil. Of these, natural gas provides perhaps the starkest outlook (Hayes 1979). We have sold it at a fraction of replacement cost, for political reasons. Usage has been about 25 trillion cubic feet per year. As discoveries have fallen off, a domestic peak in reserves (around 209 trillion cubic feet) was passed in the 1960s. New supplies can be developed such as gas from Devonian shales of the Appalachian Basin. However, the resource is scattered, costs are high, and production rates very low. Responsible estimates are that we may add 25 trillion cubic feet, not enough to change patterns of supply and use (U.S. Congress 1977).

Coal and oil shale are solid energy resources we have in abundance (Hayes 1979). Perhaps 250 billion tons of coal are recoverable. Why don't we use it more? There are several parts to the answer. First, our mobile society needs portable fuels. To be most useful, solids first must be changed to a more usable form; technically this is difficult, and methods are not well established. Coal usage is restricted and made costly by any honest application of environmental protection regulations (Gordon 1978). Even when coal facilities have been designed to absolutely minimize adverse impact (Environmental Science and Engineering 1977a), some residue is very difficult to dispose of (Environmental Science and Engineering 1978). Transportation of western low-sulfur coal to eastern users in quantity is a major obstacle, and energy-intensive. And if these problems were not enough, use of coal promises production problems and social concerns as miners must be recruited and trained, and portions of the West rapidly urbanized.

Nuclear energy was to be our salvation; unfortunately, its story is one of decreasing expectation (Hayes 1979). Predictions of electrical energy to be supplied by 1985 have dropped from 240 gigawatts (1973 estimate) to 110 (1978 estimate), as contrasted with a current 48 gigawatts. Safe waste disposal and safe, reliable operation are critical needs. A further constraint may be limited nuclear fuel resources to supply current nuclear technology. Technical solutions may be possible (Environmental Science and Engineering 1977b), but are likely to come only with difficulty and substantial cost.

In summary, the conventional energy resource picture, while almost satisfactory now, looks bleak indeed for meeting longer-term desires of our energy-hungry Western society. Like it or not, for several decades countries such as Saudi Arabia hold the key to our life style and well being (Franssen 1978). Furthermore, we should be carefully orchestrating a managed transition to a "new" energy economy, one with greater chance to continue on a self-sustaining basis.

The Renewable Energy Resource Picture

Our hospitable world exists as we know it solely because of continuous exposure over millenia to energy from the sun. Fossil fuels came from a solar source; the sun drives biomass production today, and fuels winds, hydropower, and other basically solar sources. Thus, it is natural that we look to the sun for our salvation. In the broad sense, solar encompasses almost all "soft" or "distributed" energy technologies. (Geothermal often is listed with this group but is not basically solar; it also may often not be renewable in less than a geological time frame.)

The criteria used to characterize "soft" systems and to differentiate them from "hard" alternatives are that they be basically (Christen, Craig, McGuire and Simmons 1977): (1) renewable, (2) environmentally benign, (3) locally available, (4) subject to graceful failure, (5) foolproof, (6) flexible, (7) comprehensible to those dependent on them, and (8) matched in energy quality to use. One could hardly disagree with such noble objectives. And certainly in the judgment of many, these contrast with characteristics of "hard" technology devices. Environmental and social criteria are imbedded in the list; that is, societal goals are assumed based not just on quantities of goods and services provided, but on a perhaps ephemeral state of "well-being." Economic costs frequently are not included; it is assumed implicitly that costs will overlap to a degree that other factors will be of primary concern. Obviously, trade-offs between economic criteria and measures of well-being will be necessary.

A "Distributed" Energy California Future

A recent study has assessed how California could meet its needs using primarily renewable sources (op. cit., 1977). The resource base suggests that this might indeed be feasible, as shown by Table 2.

Table 2

California Resource Estimates for the Year 2025 (Craig, McGuire and Simmons 1977)

	Annual Energy, Quads*		
Resource	Heat	Electrical or Mechanical	Fuels
Direct Solar Energy	immense	immense	
Biomass, Land			0.57-0.71
Biomass, Ocean			0.46-0.92
Wind		2.4-9.4	
Geothermal	34	0.67	
Hydroelectric		0.23	
Ocean Thermal		Nil	
Fossil Fuels			Nil

* 1 Quad = 10^{15} Btu

Solar insolation, for example, is about 1370 Btu/ft^2-day or 2450 quads per year; about 350 times current fossil energy use. Likely limits are given in Table 2. Even if biological efficiencies are no more than a modest 1 percent, this still leaves a generous supply. Municipal solid and liquid waste, agricultural residue, forest wastes and kelp farming of 10 to 20,000 square miles of ocean were included. Wind energy is uncertain due to poor data for the few areas where high winds make the resource most useful. Geothermal energy is well established but in a unique area; extrapolation may not be reliable, and life of the resource is not known. Solar energy for heating and cooling is essentially unlimited, though other claims on land will bring some real upper limit.

From this starting point, alternative future scenarios were developed and end-use demand established by categories: electricity, low-temperature heat (below 350°F), high temperature heat, and liquid fuels. These were further separated by sectors: agriculture, other industry, transportation, commercial, and residential. A supply/demand balance was developed for each of several scenarios. One such, for "soft" technologies, a distributed resource base and relatively low demand is given in Table 3. A centralized, "hard" technology alternative to meet the same basic needs is given for comparison in Table 4. (Many assumptions that underlie development of these data are not practical to detail here.)

These authors draw several observations generally supportive of distributed systems. In their view, environmental impacts are markedly smaller for "soft" than for "hard" alternatives. (The "soft" alternatives include increased end-use efficiency, active and passive solar heating and cooling with individual building or neighborhood units, fuel from biomass wastes, and dispersed, on-site wind electric generators.) By way of contrast, energy/land use conflicts will jump by orders of magnitude--for example, solar process heat and electricity supply next to industry served would use about a quarter of all urban land, a gigantic and potentially costly impact. Other concerns include reliability and need for costly, inefficient energy storage. These are major concerns. They hold the potential to inhibit substantially a transfer to "soft" alternatives on a scale meeting needs of a large share of our population.

Other studies also support the "soft" path. For example, a federal interagency Solar Energy Policy Committee report is said to state that by the year 2000, up to 20 percent of energy needs could be supplied by solar (anonymous 1979). For this to happen, though, would require massive federal support and a rapid rise in world oil prices. Subsidies for solar largely are justified by the argument that fossil fuels already receive massive aid.

Table 3

Supply/Demand Balance, Distributed Case (in trillion Btu)
(Craig, McGuire and Simmons 1977)

		Heat		
	Electricity	<350°F	>350°F	Liquid Fuels
Biomass				
Waste				480
Tree Farm				100
Kelp				444
On-Site Solar Heating		432		
Cogeneration	146	195	39	
Geothermal	327			
Hydroelectric	136			
Wind	666			
On-Site Solar Cogeneration				
High Temperature	39		259	
Low Temperature	162	1078		
Solar Electric	629			
TOTAL	2105	1705	298	1024

Other Solar Viewpoints

Not everyone agrees that because the sun shines our energy woes are almost over. Hayes (1979) is anything but an enthusiast. In his words:

> The lure of free power from the sun has blinded many people to the economic facts of life. No other part of the energy spectrum generates as much optimism, emotion, and misinformation.... A fallacy...is that because the sun's radiation is free, technology will convert it to a cheap source of inexhaustible energy.... It is a dilute form of energy and is available only part of the time, hence the processes by which it can be put to use are inefficient by our present standards or economics.

He concludes that six to seven quads by the year 2000 is optimistic, though there is hope for growth in the more distant future. Marjorie and Aden Meinel, among the longtime advocates of solar energy development, also caution against overly optimistic assessments (1979). They note that (1) sunshine is not dependable, particularly in winter when most needed; (2) complete systems are expensive; (3) solar components

Table 4

Supply/Demand Balance, Centralized Case (in trillion Btu)
(Craig, McGuire and Simmons 1977)

		Heat		
	Electricity	<350°F	>350°F	Liquid Fuels
Synthetic Liquids				2163
Synthetic Gas				
Cogenerated Fuel	534		860	
Cogenerated Heat			824	
Other Industry			147	
Geothermal	327			
Hydroelectric	136			
Central Station	4			
Coal or Nuclear	1182			
TOTAL	2020*		1831	2163

* The data in this column add to 2183, not 2020 as given in the source document, most likely due to a typographical error in the energy from coal or nuclear.

and systems are unreliable over lifetimes; (4) backup supplies and storage are needed; and (5) performance does not achieve optimistic projections.

Actual experience has been mostly limited to simple, low temperature applications, which may well prove to be the best use of solar technologies. Analysis of experience from the Florida Solar Energy Center suggests "significant" problems with at least 20 percent of installations (Sim 1979). Largely these represent careless design, construction, installation and the like which should disappear or become manageable with growth of a large-scale, experienced industry. But each step to reduce such problems will mean adding to the infrastructure and creating a more complex operation, higher costs, and ultimately a less competitive position than indicated by optimistic projections. Similarly, assessment of potential for solar electricity throughout the southeastern U.S., even assuming breakthroughs in photovoltaic devices, is not entirely optimistic (Sim 1979). Environmental impacts may be minor, but socioeconomic and institutional barriers seem likely.

Biomass, particularly as energy plantations, also has been found wanting when considered for application over large regions (Environmental Science and Engineering 1977b). Critical problems in the western U.S. would be water supply, land, and fertilizer. Typical needs for a one megawatt-electric equivalent biomass supply, such as to serve a small community, would be 740 acre-feet of water per year. To put this in perspective, with much greater conservation or wiser use than at present, 1000 megawatts might supply 1000 distributed small communities and a population of one million, a small fraction of present southern California population. Total water needs for a biomass energy supply for these people then would be 740,000 acre-feet per year. This can be compared with the Southern California Metropolitan Water District allocation in the 1980s of 606,000 acre-feet from the Colorado River, or its ultimate 2,011,500 acre-feet from the giant California State Water Project (Environmental Science and Engineering 1977b). Corresponding land requirements are measured in hundreds to thousands of square miles, and fertilizer in rail carloads per day.

Of solar electric technologies wind is nearest to practical use on a scale large enough to make inroads on our energy supply mix. A California Energy Commission plan (Ginosar 1979; Mello 1978) shows it to be a feasible, renewable energy source important for our future. Technology requires at best extension from a "pilot plant" to normal scale, with industry capable of expansion to meet demand. Data on available energy are limited but the available resource is known to be modest. A benefit is that for appropriate scale technology there also is a short payback period. Contrary to the views of some enthusiasts, dispersed, small-scale or individual systems are not expected to pay their way (Ginosar 1979). Safety, reliability, storage, and backup system requirements will establish a minimum of scale. Perhaps most important, people live in patterns such that truly distributed systems serving local needs could make at best a very minor contribution toward meeting total societal needs, even if developed at any cost.

Some Specific Environmental Concerns for Solar Thermal Power Systems

Solar clearly represents a superb energy source in many locations for relatively low temperature uses. Passive building design, which really represents wise use plus conservation, is capable of very large-scale application. But if solar is to penetrate as needed to permit achievement of a "soft" technology future, it must also provide for substantial electrical power needs (Table 3). While other options are possible and may even prove to be preferred, systems discussed to illustrate "soft" technology concerns will represent solar thermal electricity generation, an area of research in progress at UCLA (Ullman, *et al.* 1978).

There is a general perception that solar technology is environmentally benign. Certainly, emissions of radiation, NO_x, SO_x, and particulates are absent. But mining for coal and its conversion will be replaced with other resource-consuming and risky activities, and these eventually on a large scale. Individual small-scale systems (such as 10 megawatts) are considered. The kind of adverse effects likely to be noted first are hazards to workers and the adjacent environment. Any complete facility will require storage and backup systems. Impacts of these additional facilities thus also must be noted.

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The question may be asked, why not individual home, few-homes, or cottage industry systems? The answer is clear. For electricity in any pattern close to present use, too-small systems will prove totally impractical. As noted by the Meinels (1979), what person will be able to handle maintenance on any but the most rudimentary system? Risk may prove greater than society could accept with do-it-yourself systems.

Any analysis at this stage of development must be speculative; there are no pilot data and no history. However, enough is known to at least provide useful comparisons. Three questions must be answered: (1) what hazards exist or may be initiated by outside events? (2) how do these represent dangers to those exposed? (3) what potential results can be expected from these hazards? Each facility design will share some common elements: (1) a means to concentrate solar energy, (2) a means to capture solar energy, (3) a means to convert thermal to electrical energy, (4) a means to dispose of waste heat, and (5) a means to store and recover thermal energy. Concerns will vary with the design considered. We will focus very briefly on selected concerns in three areas: (1) receiver subsystem hazards, (2) storage systems, and (3) loss-of-coolant accidents (LOCA). Other concerns have been postulated and merit review.

Receiver Subsystems

As noted above, the sun's energy must be concentrated and captured in order to convert it to electricity. A critical element thus is the receiver subsystem, which receives energy and turns it over to heat transfer fluids which then carry it to the parts of the system in which electricity is generated. Heat transfer fluid candidates include eutectic salts, liquid metals, hydrocarbon oils, and water/steam. Closed systems typically contain hot, pressurized media. Rupture of fluid lines is a serious threat.

Eutectic salts are irritating or toxic when released and inhaled. Heated (1000°C), they may rupture a container and ignite combustibles. During fires toxic nitrogen oxides are released from sodium nitrate and nitrite decomposition (at about 380°C). Liquid metals pose different problems. Sodium reacts violently with either air or water. Hydrolysis releases heat to start fires, and hydrogen released may burn explosively. Oil use may be limited to avoid degradation which could lead to much less-desirable byproducts. Leaks will cause a fire hazard and probable toxic fumes. With water and steam, corrosion inhibitors are a concern: chromate, borate, nitrate, nitrite, sulfate, sulfite, arsenate, and benzoate salts; triazole, silicate, and phosphate compounds. Glycols protect against freezing; bactericides (azides, chlorinated phenols) may prevent fouling of heat transfer tubing. These are toxic, and the latter may be carcinogenic.

Storage

Thermal storage systems are essential to permit operation with cyclic input, changing through the day and with climatic variability. Storage may be as sensible heat, as latent heat, or by thermochemical systems.

Sensible heat is the least complex and best understood alternative. With water, technology for making large enough pressure vessels seems inadequate. Oil requires reprocessing and replacement frequently. Liquid metals and molten salts are risky materials, needing expensive containment and handling. Latent heat storage may use eutectics, but NaF/NaF_2 requires high temperatures. Thus, mercury has been used for actual heat transfer with serious technical difficulties and environmental risks. Lithium hydride may perform well, but is expensive. Potassium/sodium nitrite is hard to contain and corrosive. Thermochemical storage uses reversible reactions with large heat effects. Inorganic hydroxides may be simplest and need only cheap materials, as:

$$Ca(OH)_2(s) + Heat \rightleftarrows CaO(s) + H_2O(g)$$

Stored energy can be released by adding superheated steam. Decomposition of sulfur trioxide is another option:

$$SO_3(g) + Heat \rightleftarrows SO_2(g) + \tfrac{1}{2}\, O_2(g)$$

Capital costs will be high as corrosive reactants are involved.

At present, sensible heat devices are favored. "Safe" systems, unfortunately, are likely to be costly. Clearly, there will be concern for environmental, health, and safety hazards with storage systems.

Loss-of-Coolant Accidents

Several off-normal events can be postulated. These may lead to system failure and adverse impacts, much as with nuclear power. Loss of coolant accidents (LOCA) and loss of heat sink are examples. In a LOCA, flow of coolant to the receiver subsystem ceases while solar input continues. Without protective measures, the receiver will overheat and may fail by rupture or melt-down, releasing fluid. Concern for failure has led to emergency core cooling for nuclear plants. With solar, two passive cooling modes exist (convection or conduction, and radiation).

Example data based on the Barstow 10 megawatt plant have been analyzed to establish end results of a LOCA. These show that (by static analysis) losses would not offset input and the melting point of the receiver metal (inconel) could be reached. Thermal meltdown would take time: more than 200 and less than 600 seconds. These are short enough to require protective design. Failure clearly could lead to a succession of other system failures, and numerous adverse impacts.

Solar Electric Environmental Summary

This very brief review of a tiny portion of the area to be assessed for impacts from solar thermal electricity generation tells us much. First, many environmental concerns will be technology-related and largely at the plant site. Solar may be much less risky than nuclear or fossil fuel technologies. However, handicapped by a dilute and variable source, solar efficiency must be stretched if it is to replace coal and other less preferred technologies. This will require complex systems, exotic materials and fluids, and may well impose significant risks on employees and surroundings. Useful solar thermal electric facilities thus may not be truly benign; specifically, they may not fail gracefully, be foolproof, flexible, or comprehensible (to other than specialists). The ultimate effect will be seen as higher costs, making this form of solar less competitive. This is particularly important to the potential for truly "distributed" systems. Central systems, though of modest size, appear essential for a useful, reliable resource.

Other solar alternatives may evoke fewer or greater concerns. Biomass, which to so many appears benign, may conceal a host of severe environmental impacts. Wind seems particularly favorable, but certain to be excluded from densely populated areas and limited to a few quite high wind speed locations. Passive solar and low temperature heating avoid most problems and should be undergoing massive development. However, even these commit vast areas of land to controlled use, and require huge resources for collector construction. Photovoltaic generation of electricity appears at present as the last great hope, though perpetually "just around the corner" and waiting for another breakthrough to become useful. The breakthrough may well occur. Realistically, however, there are potential environmental concerns with this technology as well. Thus there is merit in caution against all overly optimistic projections.

Summary

From the information above a useful picture emerges. The shrinking conventional resource base is evident. Fossil fuel alternatives are not cheaply or rapidly introduced, and most are fraught with environmental concern. On the other hand, several "soft" technology alternatives seem less attractive when subjected to serious scrutiny. Though relatively benign, there is enough of concern to raise costs and slow or inhibit utilization. It still is easy to remain optimistic because little is well understood. This is all too reminiscent of the early days of nuclear development.

Our relatively free society must choose between numerous feasible alternatives; trading off benefits and costs or environmental gains and losses, and establishing our own priorities. The choices to be made are extremely difficult. The alternatives are technically complex, potential future impacts are vast, and our entire societal structure and life style appear to be at risk. Furthermore, decisions must frequently be made in an atmosphere of siren songs sung by charismatic leaders of oppositely polarized factions.

To this point nothing in this paper has specifically addressed energy and resource education. However, this author believes that points made earlier make clear many educational requirements to meet our changing needs. The most important of these requirements are summarized below.

A delicate balancing of depth and breadth is essential. The problems to be addressed range from hard technology, through the entire gamut of knowledge of the natural environment, and continue into a deep involvement with the social world in which we live. Depth within a subject area may be essential, but it is not sufficient. Specifically, if decisions regarding an energy future are largely left to engineers (or other technologists) with no more than a suitable disciplinary background, they will likely come up with predictable "solutions" emphasizing what they best understand. Experience should have taught us that these too often extrapolate the past in a nearly linear fashion, and disregard emerging problems lying outside background disciplinary competence. Thus, these "solutions" are inherently limited, not optimal, and lead to magnified future problems.

Breadth, while another essential, also is not sufficient. Generalists with overview knowledge too frequently have not experienced work in depth within the problem areas likely to emerge as critical for environmentally sound development of a new energy resource. Such individuals appear too ready to grasp at wished-for "solutions" in a thoroughly uncritical way. These "solutions" may be widely heralded in the media, only to fall apart when qualified professionals try to put them into practice because concepts turn out to be based on incomplete and inaccurate information.

Even more appears to be needed than just an appreciation for high quality technical work and the potential importance of several disciplines. Environmentalists must understand just how the various disciplines interact to influence problem solution. This truly interdisciplinary character must permeate the very core of serious environmental studies. Examples are easily visualized. Consider a conservationist future featuring massive growth in use of solar heating, for example, extending into the urban core. Substantial resources will have to be committed: glass, aluminum, plastic; the energy and manpower to construct, install, and operate devices through a lifetime. Usage of urban space for collectors will constrain building design. Space needs may in some cases extend urban travel distances, restrict opportunities for recreational open space, and conflict with esthetic perceptions. Finally, restricted mobility by comparison with past projections, and other limits imposed by a need to conserve, almost certainly will result in social strains. It is no trivial task to prepare students well to function across this spectrum of challenging requirements--part environmental scientist, part engineer, part humanist, with common sense as well--while retaining competence within a central discipline.

If the educational requirements which appear obvious from the data base presented in this paper are not met, it will likely prove most difficult to achieve properly balanced "future" thinking and societal leadership. But if they can be met, we may well effectively pass through a transition from dependence on availability and waste, to a least-environmental/social-cost and relatively affluent energy future.

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TOWARD A NATIONAL STRATEGY FOR ENVIRONMENTAL EDUCATION

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James Greager, Thomas Hudspeth, David Jasperse, Lori
Mann, Augusto Medina, Gary Prosch, Pamela Puntenney,
Deborah Simmons, and Evelyn Wilke[1]

Abstract. *This presentation explores the current status of a national strategy for environmental education in the United States. A brief historical account of the Tbilisi mandate for a national strategy is employed to set the stage for the identification and analysis of actions that have been taken toward a United States plan. Actions that are necessary components of a strategy and have not been pursued in this country are examined. Concrete suggestions for individual and group involvement in facilitating the future plans for a national environmental education strategy are offered.*

I. INTRODUCTION

The evolving goal of environmental education (EE) is to foster an environmentally literate global citizenry that will work together in building an acceptable quality of life for all people. Much of the foundation needed to realize this goal has been laid by many committed people throughout the world. In 1977, delegations from approximately 70 nations convened at the Intergovernmental Conference on Environmental Education in Tbilisi, USSR, and unanimously articulated that goal. The basic aim of environmental education as defined by the participants of the Tbilisi conference is:

> to succeed in making individuals and communities understand the complex nature of the natural and built environments resulting from the interaction of their physical, biological, social, economic and cultural aspects, and acquire the knowledge values, attitudes and practical skills to participate in a responsible and effective way in anticipating and solving environmental problems, and in the management of the quality of the environment.

At this international conference, we pledged to do our part as a nation to support the international momentum for EE. We can help fulfill that pledge by coordinating our actions and developing a national strategy for EE.

---

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The Need for a National Environmental Education Strategy

> Many observers of EE in the U.S. are convinced that the movement's number one problem is its lack of cohesion. We are many bodies (some federal, some state, many private) in need of a head. The arms, the branches, all are laboring mightily, but without enough coordination.[2]

--Alexander Barton
Development Program Director
National Science Foundation

The United States has no national plan for maximizing environmental education efforts. There is a strong need to work toward a national strategy that will achieve the goals and objectives of EE that have been stated clearly at Tbilisi. By recognizing the strong local, state, regional, national, and international efforts that have been made over the past decade, and building upon these efforts, we can further EE in the United States and throughout the world. Now is an appropriate time to constructively link these efforts and capitalize on the synergistic effect a coordinated national strategy can provide.

The Elements of a National Environmental Education Strategy

A strategy is a plan to help resolve specific issues that have been identified. Figure 1 outlines the key elements of a national EE strategy, each of which is briefly discussed below.

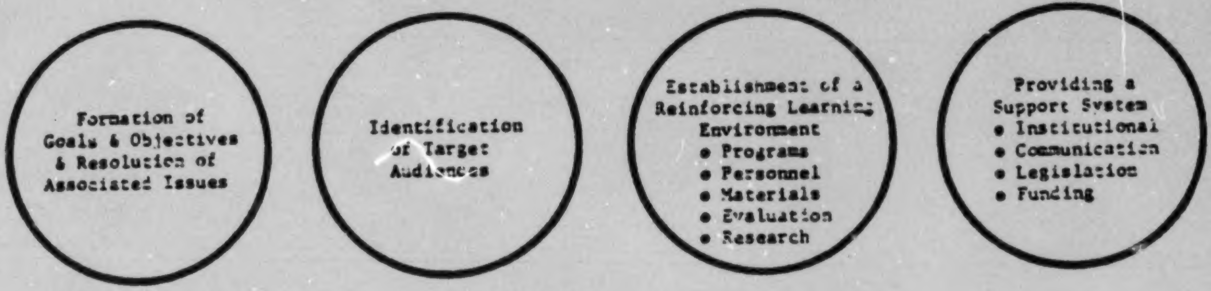

Formation of Goals & Objectives & Resolution of Associated Issues
Identification of Target Audiences
Establishment of a Reinforcing Learning Environment
• Programs
• Personnel
• Materials
• Evaluation
• Research
Providing a Support System
• Institutional
• Communication
• Legislation
• Funding

Figure 1.--Key Elements of a National Strategy for EE.

1. A framework of goals and objectives needs to be clearly established and constantly reviewed and the resolution of associated issues should be addressed. Much of the foundation for this framework has been well defined by the work at Tbilisi and other international and national conferences. What directions do we as a world community wish to choose? These goals and objectives should act as guides for any future actions we take.

2. Target audiences need to be clarified. Many past efforts have developed in comparative isolation and reached limited audiences. Too often, EE efforts are aimed primarily at formal education and minimize nonformal modes of education.

3. Action programs should be identified, planned, and implemented which include development of program models and instructional materials and preparation of personnel in both formal and nonformal education.

4. Evaluation helps ensure the quality of EE programs and materials by determining whether we have achieved our stated objectives. It should be an ongoing process in all areas of EE if we are to meet the needs of our target audiences.

5. Research should become an integral part of our movement. We need to keep abreast of developments in related fields and their significance to EE. Professionals in our field should be supported in efforts to determine the most appropriate educational methods.

6. Institutional support systems should be identified and established where necessary to provide the assistance needed to move us toward a national EE strategy. We can begin by determining how to best coordinate through existing institutions. The Alliance for EE and the Federal Interagency Committee on Education (FICE) are two examples of organizations that have linked their members in order to use their resources more effectively. What new linkages can create more cohesion between institutions?

7. Communication support systems need to be developed to utilize existing systems and coordinate to a higher degree our local, state, regional, national, and international efforts. The Educational Resources Information Center (ERIC) system is one vehicle by which the activities of our profession are documented and shared around the world. What additional types of communication can be utilized to reach an even wider audience?

8. Legislation can be effective at both the national and state levels in furthering EE by encouraging leadership, fostering the development of programs and materials, promoting teacher education, stimulating research and evaluation, and providing financial resources to support EE activities.

9. Financial support systems should be identified, and their funds allocated for maximum national benefit. For nearly ten years, the Office of Environmental Education (OEE) has provided funding for the development of projects such as curriculum models, teacher training programs, and community workshops. However, funding is limited and we should decide how future funds can best be allocated to achieve our stated goals and objectives.

A viable plan of action brings together all of these elements into a reasonable, workable timeline to identify procedures, develop priorities, and assign responsibilities. This plan, or strategy, should have built-in flexibility to allow for the mid-course adjustments that ongoing evaluation and research will suggest.

In addressing each of the above elements, we are faced with specific problems. We have made a special effort in each section of this paper to identify some of the important concerns confronting the field of EE. Solutions to these problems should be addressed in our national EE strategy.

An Overview of this Paper

Three of the major purposes of this paper are to:

1. provide an historical background of EE so that we may effectively build upon the foundations of the movement;
2. identify some of the major problem areas that confront the field of EE; and
3. outline one process for developing a national strategy for EE.

In Section II, we begin with an historical account of the development of EE, providing a perspective which sets the stage for future planning.

In Section III, we discuss the goals and objectives needed to provide direction for a potential strategy and recognize a series of unresolved issues that confront the movement of EE. The range of target audiences needed to provide input and assume responsibility for making a strategy work are identified.

In Section IV, we examine the necessity of building a reinforcing learning environment to meet the needs of the diverse EE audiences through the development of programs, materials, and training strategies for EE facilitators.

In Section V, we focus on the need for a support system. This includes appropriate institutional and organizational arrangements, effective communication, special legislation and adequate funding. Together, these four components can help to provide an effective support system for EE.

In the last section, a plan for developing a national EE strategy is suggested and concrete actions to implement this plan are offered for consideration. A timeline for executing this plan is included to continue the momentum generated at Tbilisi in 1977 and furthered in Washington in 1978.

The suggestions and strategies presented in this paper are not meant to be a definitive plan. Rather, they are suggestions to be considered.

The suggestions strive to provide flexibility during the planning and implementation of a national strategy for EE.

II. AN HISTORICAL PERSPECTIVE OF ENVIRONMENTAL EDUCATION

> We must move toward a coherent national strategy for EE that takes full advantage of the strength of our diversity...any strategy or plan will have to provide for appropriate division of labor among the various elements of the private sector...and the different levels and agencies of government.[3]
>
> --Mary Berry
> Assistant Secretary for Education
> U.S. Department of Health, Education and Welfare

Over the past decade, significant steps have been taken in defining needs and developing and implementing plans that have furthered EE at the national and international levels. The framework of this paper makes it difficult to address ten years of important EE achievements and to give credit where it is justly due. An extensive bibliography (Appendix B) suggests sources for acquiring additional information in this area.

Figure 2 assembles historical EE landmarks and divides them into five major strands (International Environmental Education, National Conferences, National Legislation, Communication Networks, and Professional Environmental Education Organizations). The figure also illustrates the limited interdependence that has traditionally existed between these strands. Weaving these threads into a coordinated effort should be a major focus of our national EE strategy.

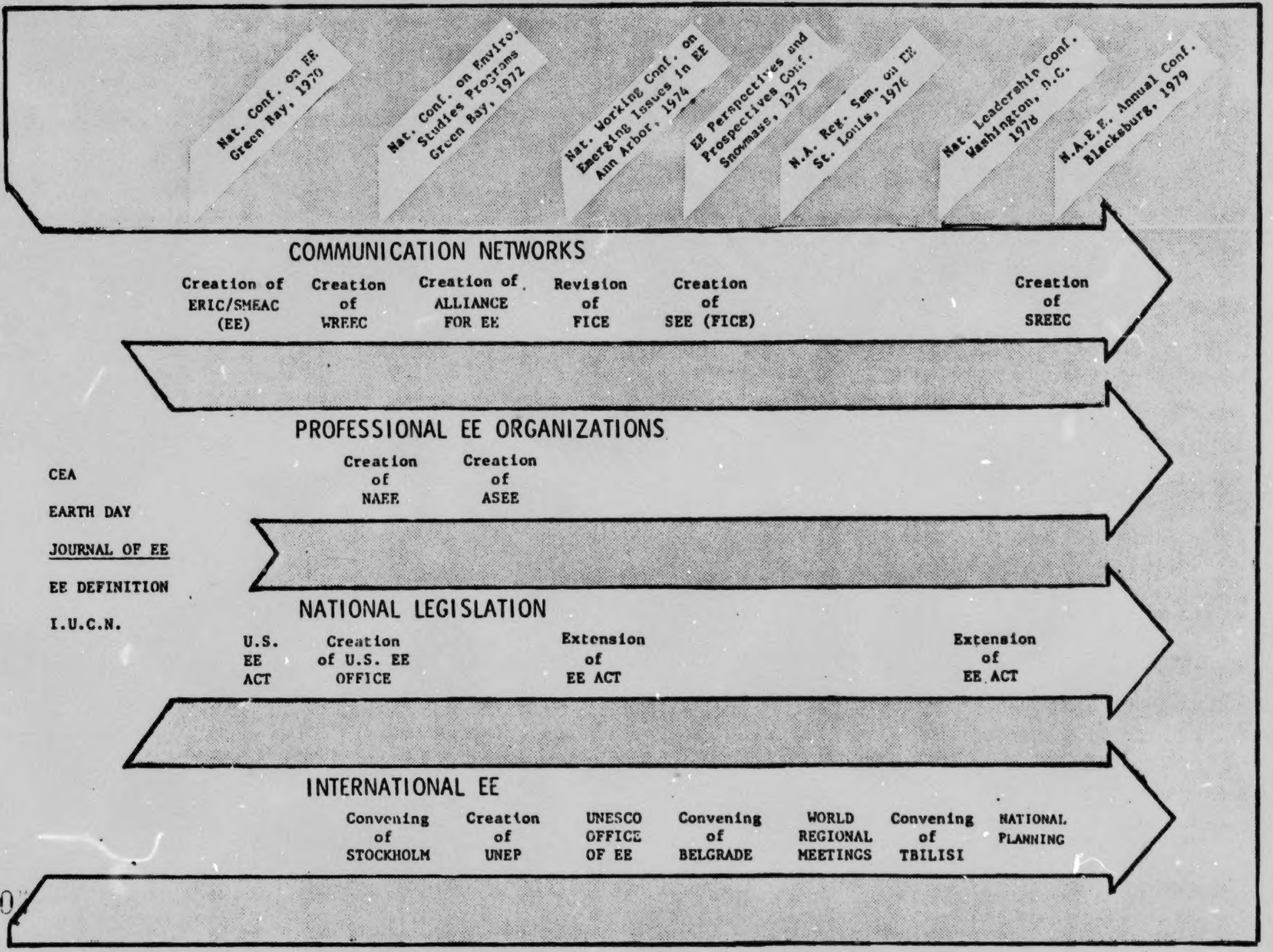
A brief overview of each strand follows.

International Environmental Education

The United Nations (UN) Conference on the Human Environment (Stockholm, 1972) documented the need for a cooperative international EE effort by proclaiming: "To defend and improve the environment for present and future generations has become an imperative goal for mankind."

In 1975, the international EE component of the United Nations Educational, Scientific, and Cultural Organization (Unesco) initiated a three-year program to further EE internationally. This four-phased program resulted in an international workshop (Belgrade, Yugoslavia, 1975), five world-regional meetings (1976), an Intergovernmental Conference or EE (Tbilisi, USSR, 1977), and institutionalized support for developing national strategies for EE. Major funding was provided through a grant from The United Nations Environment Program (UNEP).

Figure 2. Major Environmental Education Landmarks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Green Bay, 1970
Nat. Conf. on Enviro. Studies Programs Green Bay, 1972
Nat. Working Conf. on Emerging Issues in EE Ann Arbor, 1974
EE Perspectives and Prospectives Conf. Snowmass, 1975
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COMMUNICATION NETWORKS
Creation of ERIC/SMEAC (EE)
Creation of WREEC
Creation of ALLIANCE FOR EE
Revision of FICE
Creation of SEE (FICE)
Creation of SREEC
PROFESSIONAL EE ORGANIZATIONS
CEA
EARTH DAY
JOURNAL OF EE
EE DEFINITION
I.U.C.N.
Creation of NAEE
Creation of ASEE
NATIONAL LEGISLATION
U.S. EE ACT
Creation of U.S. EE OFFICE
Extension of EE ACT
Extension of EE ACT
INTERNATIONAL EE
Convening of STOCKHOLM
Creation of UNEP
UNESCO OFFICE OF EE
Convening of BELGRADE
WORLD REGIONAL MEETINGS
Convening of TBILISI
NATIONAL PLANNING

National Conferences

Starting in 1970, there have been six national conferences, each with a different focus on EE. The sixth and most recent, entitled "From Ought to Action National Leadership Conference on EE" (Washington, D.C., 1978), formed working groups to review recommendations from all of the previous national and international meetings. The outcome was the drafting of 16 definitive recommendations relating to a national strategy for EE.

National Legislation

In 1970, Congress responded to the national effort to address the complex and urgent problems of environmental quality and the quality of life by passing the National Environmental Policy Act (NEPA), and the Environmental Education Act. In 1971, the OEE was created to administer the EE Act. Throughout the 1970s, the major priority of the OEE has been to fund local EE projects such as the development of teacher training models, curriculum materials, and community-based programs. A major result of the EE Act has been the encouragement of state EE planning and legislation.

Communication Networks

In 1969, the Journal of Environmental Education (JEE) published a formal definition of EE. Throughout the growth of EE in the 1970s, the JEE and ERIC/SMEAC have played a vital role in selectively publishing the materials produced by practitioners in the field of EE.

The Alliance for EE, a consortium of nongovernmental organizations and the FICE Subcommittee on Environmental Education (FICE/SEE), its federal counterpart, have respectively linked various nongovernmental and governmental organizations having common interests in EE.

Regional coalitions have been formed for similar purposes. These include the Western Regional EE Council (WREEC), the Great Lakes EE Council (GLEEC), and the Southern Regional EE Council (SREEC).

Professional Environmental Education Organizations

Three major professional organizations have sponsored annual conferences and provided an arena for the exchange of information. They are the Conservation Education Association (CEA), the National Association for EE (NAEE), and the American Society for EE (ASEE). Each organization has greatly helped to expand and strengthen the field of EE.

Although EE has progressed over the past ten years, there has not been a concerted effort to develop a coordinated and coherent national strategy for EE. An important immediate task is to help unite the strands outlined in this section in an effort to work toward our defined EE goals and objectives. Only when the strands are interwoven can our national EE goals and objectives of EE be obtained effectively.

The following section of this paper recognizes the need for clarity in the goals and associated issues of the EE movement, and the specific objectives and target audiences toward which EE programs are directed.

III. THE DIRECTION OF ENVIRONMENTAL EDUCATION

One of the most critical elements we face in developing a national strategy for EE is the formulation of long-range goals and near-term objectives as they affect various target groups. The effort to define the goals and objectives of EE culminated in Tbilisi when the following statements were formulated and unanimously adopted:

Goals and Objectives of Environmental Education

1. to foster clear awareness of, and concern about, economic, social, political, and ecological interdependence in urban and rural areas;

2. to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment, and skills needed to protect and improve the environment;

3. to create new patterns of behavior of individuals, groups, and society as a whole toward the environment.

Categories of Environmental Education Objectives

1. Awareness: to help groups and individuals acquire an awareness of and sensitivity to the total environment and its allied problems;

2. Knowledge: to help social groups and individuals gain a variety of experience in and acquire a basic understanding of the environment and its problems;

3. Skills: to help social groups and individuals acquire the skills for identifying and solving environmental problems;

4. Participation: to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems.

The Tbilisi formulations were discussed at the National Leadership Conference on EE (Washington, D.C., 1978). Although no vote was formally taken, there was general agreement among the conferees that these goals and objectives were in keeping with their desired direction for EE in the United States.

Even though there seems to be a consensus regarding these broad goals and objectives, the movement of EE is still faced with a series of unresolved issues that a national strategy should address. Some of these issues were raised at the National Working Conference on "Emerging Issues" (Ann Arbor, 1974). The nine EE issues selected for analysis at this conference were:

1. The constituency of environmentalists;
2. The relationship between environmental issues and the issues of social justice;
3. The relationship between environmental issues and economics;
4. Environmental education and the concept of values;
5. Skill training in environmental education;
6. The autonomy and integrity of the learner in environmental education;
7. Local versus global perspective in environmental education;
8. The support system for environmental education; and
9. The relationship between environmental education in schools and the structure and process of formal education.

Of these, three issues--constituency, social justice, and economics--deal with environmental problems and the environmental movement generally. The other six issues deal explicitly with EE itself: its goals (values and skills); its ethics (learner autonomy); its emphasis (local versus global); and the context in which it takes place (support systems, formal education).

It is important to EE that there be greater clarity on key issues that underlie its philosophy. A national EE strategy can provide the focus for such discussions.

The identification of EE's various target audiences is also important. The principal audience categories of EE, as defined at Tbilisi, that should be considered in a national strategy of EE are:

1. Education of the general public should be provided at every age level and at all levels of formal education, for pupils and teachers, and in the various nonformal education activities for young people and adults, including the handicapped. Voluntary organizations may play an important role.
2. Education of specific occupational or social groups focuses on those whose activity and influence have an important

bearing on the environment, for instance, engineers, architects, administrators and planner, industrialists, trade unionists, policymakers, and agriculturalists.

3. Training of certain professionals and scientists is designed for those working on specific problems of the environment, such as biologists, ecologists, hydrologists, toxicologists, soil scientists, agronomists, foresters, landscape architects, oceanographers, limnologists, meteorologists, and sanitary engineers. Various levels in formal and nonformal education should contribute to this training. It is important that the training of scientists include an interdisciplinary component.

In summary, although the EE movement has made significant strides in defining in broad terms the goals, objectives, and target audiences of EE, some of the key issues and audience priorities have not yet been clearly resolved. Our national strategy should focus attention on these problem areas.

IV. THE ESTABLISHMENT OF A REINFORCING ENVIRONMENT FOR LEARNING

The ultimate success of our national EE strategy lies in its ability to stimulate efforts for the development, evaluation, and dissemination of effective programs and materials. In order to achieve this, it is important that a strategy address the establishment of a reinforcing environment for learning. Programs that reach a broad spectrum of learners should be encouraged. The active involvement of learners in these programs is of vital importance. This can best be achieved by familiarizing educational facilitators (educators and leaders) with the evolving content and methodology of EE. Finally, a strategy should include provisions for the development and continued evaluation of materials that meet the needs of educators and learners in a variety of settings.

In building a reinforcing learning environment, we are confronted by many questions. What should be the desired balance between formal and nonformal EE? Is there a sufficient number of nonformal programs? Do we have adequate evaluation of instructional programs? Have we utilized fully current research in the development of instructional programs? A national strategy should consider and respond to these kinds of questions. These are analyzed below.

Formal and Nonformal Environmental Education

The major national effort in EE has been in formal education. Currently, many elementary and secondary classrooms incorporate EE into their curriculum and a growing number of colleges and universities offer interdisciplinary programs in environmental studies. Though these programs contribute significantly to furthering EE, they reach only a small percentage of the general public.

When we look at the target audiences identified in Figure 3, we readily see that the majority of learners are in the nonformal sector. Some successful programs have been undertaken to bring EE to learners such as youth groups, decision makers and mass media personnel. However, these efforts have been limited and do not fully encompass the variety of ways in which individuals can be reached outside of the classroom.

An imbalance between formal and nonformal programs is evident. We should determine the degree of emphasis that we want to provide in each sector of education. A national EE strategy should ensure that this is represented accordingly.

Regardless of how this emphasis is apportioned, we will need skilled facilitators throughout formal and nonformal education (see Figure 3). Facilitators should be aware of the orientation of specific target audiences so that they may better relate EE to the learner's own environment. They should be prepared to plan with the components of EE, including concept development, values clarification, and the development of problem solving skills.

A vast array of instructional materials is needed so that facilitators may integrate these components into their educational efforts. To nurture the interdisciplinary approach of EE and involve the learner to the greatest extent, we need to design participatory, multi-sensory, and multi-media materials. To ensure that the needs of learners are being met, materials should be developed in close cooperation with potential audiences.

Mass media is an especially influential tool that should be used to its fullest extent. It has a larger audience than any other instructional vehicle and has great potential for reinforcing EE efforts initiated in other programs.

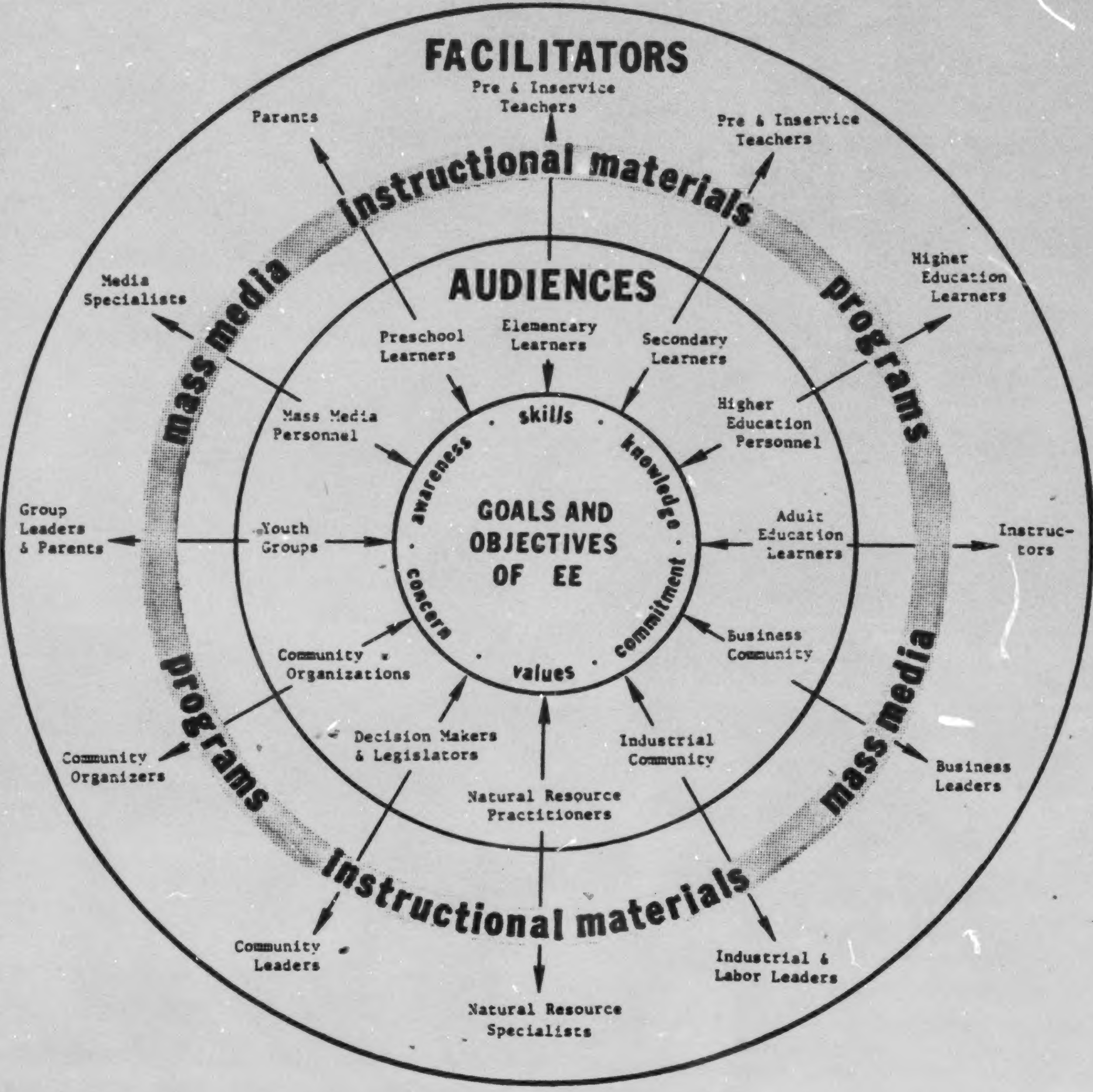
Our national strategy should provide for the development of varied instructional materials and ensure that mass media is used effectively in EE.

Evaluation of Programs and Materials

All programs and materials should be evaluated to determine how effectively they meet their stated objectives. Without evaluation it is difficult to assess whether we are helping people become informed, concerned, and skilled citizens.

Currently, many programs are not being effectively evaluated to see if stated objectives are being achieved. If we are to have quality instructional programs, a national EE strategy should encourage program evaluation and the dissemination of evaluation results.

Figure 3. Facilitators and Target Audiences for Environmental Education


FACILITATORS
Pre & Inservice Teachers
Parents
Pre & Inservice Teachers
instructional materials
mass media
programs
Media Specialists
Higher Education Learners
AUDIENCES
Preschool Learners
Elementary Learners
Secondary Learners
Mass Media Personnel
Higher Education Personnel
skills
awareness
knowledge
GOALS AND OBJECTIVES OF EE
concern
commitment
values
Group Leaders & Parents
Youth Groups
Adult Education Learners
Instructors
Community Organizations
Business Community
programs
mass media
Community Organizers
Decision Makers & Legislators
Industrial Community
Business Leaders
Natural Resource Practitioners
instructional materials
Community Leaders
Industrial & Labor Leaders
Natural Resource Specialists

Research

Research is an integral part in the development of successful EE programs. Research skills and methodology are particularly useful to teachers, leaders, and curriculum coordinators and planners. It is helpful to know the environmental background, attitudes, values, and skills of a target group prior to the development of an instructional program. It might also be helpful for the facilitator to know the most appropriate methods for the effective acquisition of relevant concepts, values, and attitudes for a desired audience. Research methods can provide some of the techniques and knowledge useful to these kinds of questions.

Courses in research methodology at the preservice or inservice level would be particularly useful to educators, leaders, and program designers in exposing them to techniques which would enable them to more effectively fulfill the objectives of EE.

A national EE strategy should address the problem of developing policies to further EE research projects and incorporate the findings into the general educational process.

V. PROVIDING A SUPPORT SYSTEM FOR ENVIRONMENTAL EDUCATION

In developing a national strategy, one of the more critical problems we encounter is how to link the EE efforts to diverse organizations. An effective support system which can facilitate interaction among these organizations is important. Such a support system should include the following components:

1. Appropriate institutional and organizational arrangements;
2. Effective communication channels;
3. Legislation; and
4. Funding

We should assess the status of each of these components and develop ways in which they can be successfully coordinated.

We need to determine whether we have appropriate institutional and organizational arrangements to meet the goals and objectives of EE. In some localities, states and regions, institutionalized support systems do exist. For example, the Western Regional EE Council (WREEC) is a coalition of 11 western states that grew out of a need for coordination of EE efforts in the western states. In other places, the need may be to strengthen an existing arrangement.

A supportive system for EE could be enhanced if communication channels between existing EE organizations were improved. An excellent example of this occurred in 1973 with the formation of the Alliance for EE.

This consortium of concerned EE organizations established strong channels of communication in order to reduce the duplication of efforts, build upon the strengths of each affiliate, and to collaborate on EE activities when appropriate.

Through appropriate institutional and organizational arrangements and effective communication channels, we can build a network that can provide strong support for the EE movement.

An example of supportive legislation, the third component in establishing a support system for EE, is the National Environmental Policy Act (NEPA) which solidified the environmental movement by requiring environmental impact statements for federally funded projects.

In 1970 the EE Act was enacted, providing for the establishment of the Office of EE and appropriating funds for grants to regional, state, and local bodies for furthering EE activities.

Several states have also had success in stimulating EE activities through legislative action. The California EE Act of 1970 empowers the Conservation Education Service in the Department of Education to encourage the development of educational opportunities specifically related to EE. The New Jersey EE Act of 1971 provides for school district EE programs, regional EE facilities for students and teachers, and curriculum research and development centers. In Florida, the EE Act of 1973 was enacted to stimulate awareness and understanding of the environment and develop problem-solving skills among students, teachers, and administrators in the state. The Wisconsin statutes require that conservation of natural resources be taught in every elementary and high school. In addition, adequate instruction in the conservation of natural resources is required for elementary teacher certification and at the secondary level in the areas of science and social studies.

A national strategy for EE should continue to utilize and promote useful environmental legislation.

Developing programs, preparing facilitators, designing materials, conducting research, and disseminating information are but a few examples of the activities we need to continue as we develop and implement a national strategy for EE. Several models exist for providing the necessary funding for such activities. California earmarks money from the sale of personalized license plates for a state EE fund. The U.S. Department of Health, Education, and Welfare (HEW) has allocated federal money to EE projects, such as the establishment of WREEC.

We should recognize the importance of these components and the relationships among them. It is especially important to pay particular attention to institutional and organizational arrangements, and ways to improve communication channels. Together, these two components comprise a network for EE. This network should enable people to have access to broad sources of support for some of the following: communicating with others, acquiring project information, developing program methodologies, obtaining funding, designing evaluation instruments, and facilitating research.

The U.S. EE network fits into Unesco's international framework as shown in Figure 4. The portion shown in bold lines is detailed in Figure 5, followed by a discussion of a possible EE network in our country.

In Figure 5, each circle represents a point of input into the overall organizational structure (node). Each node includes the people, organizations, and institutions active in EE at that level. Communication within and between nodes is important to an effective EE network.

Throughout our country, some excellent examples of networking models exist at the local, state, and regional nodes, but many organizations and programs operate in comparative isolation.

As environmental educators, we need to take inventory of our resources and identify areas of weakness by asking ourselves two questions. First, do we have the appropriate resources to facilitate communication between our organizations and local constituents? Second, do we have appropriate mechanisms to facilitate communication between our organizations and the national and international framework of which we are an integral part? We need to consider the institutional arrangements and communication channels presented on the following pages, and adjust them to meet our needs.

The institutional arrangements at the national level should be strengthened; national level institutions need to improve communication channels with the local, state, regional, and international levels. Active support from the national level will help catalyze efforts on all levels to establish links between the United States and international EE efforts.

A national strategy for EE should help strengthen the network in several ways. It should encourage public participation and communication among individuals and groups at all levels. In addition, a national strategy should facilitate communication between nodes and provide continuity and cohesion for our EE efforts.

The Local Node

In general, communication linkages between local organizations and access to other nodes needs to be strengthened. Naturally, a multitude of local organizations with EE interests are operating in comparative isolation. Some organizations and institutions such as those listed below are attempting to improve local network systems.

Formal EE	Examples of Networking
Preschool, Elementary, Secondary, Higher Education, Adult Education	Facilitates communication through journals, newsletters, periodicals, conferences, workshops, organizations, and pre and inservice programs.

Figure 4. Unesco's International Framework for an Environmental Education Network

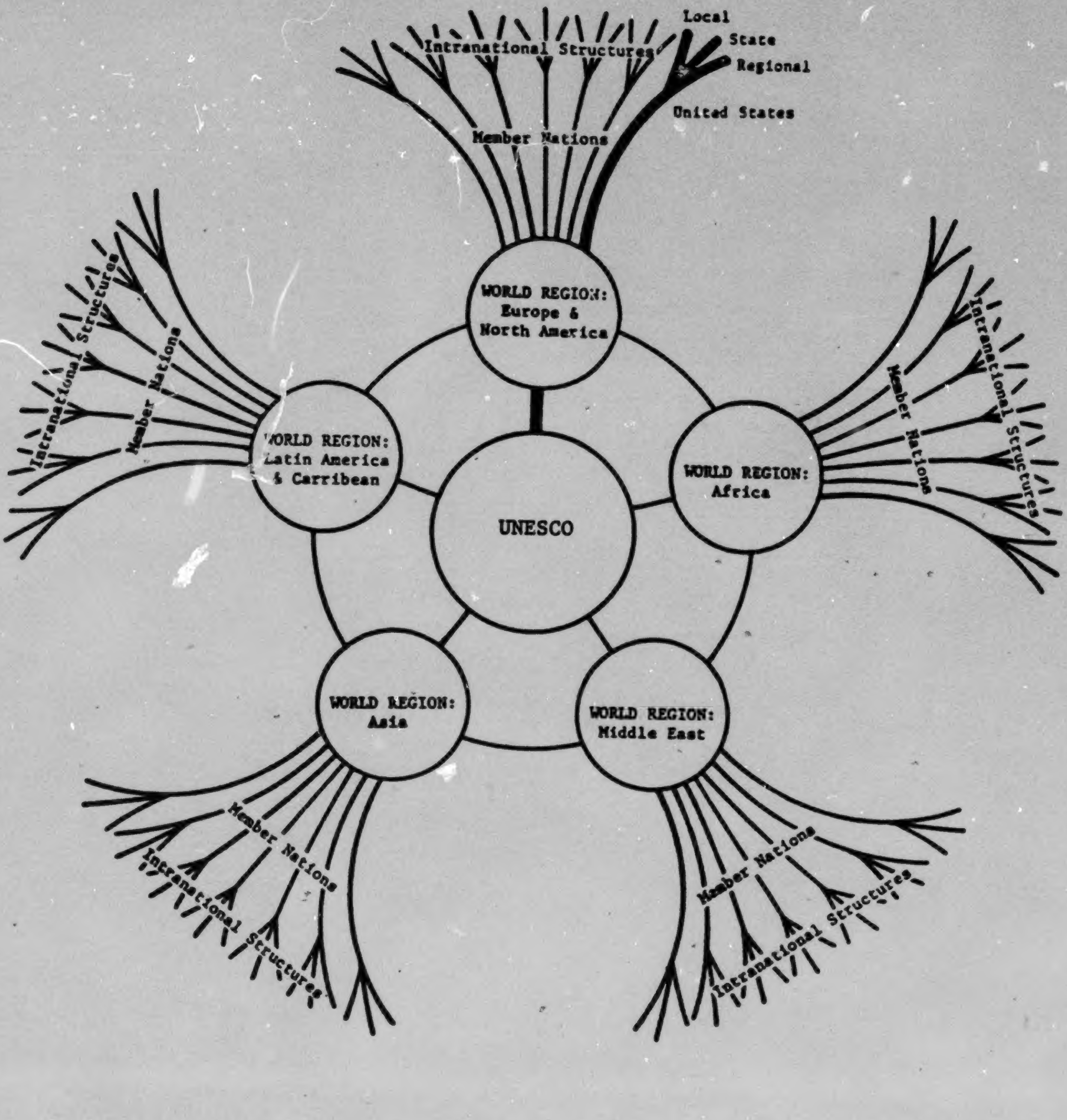
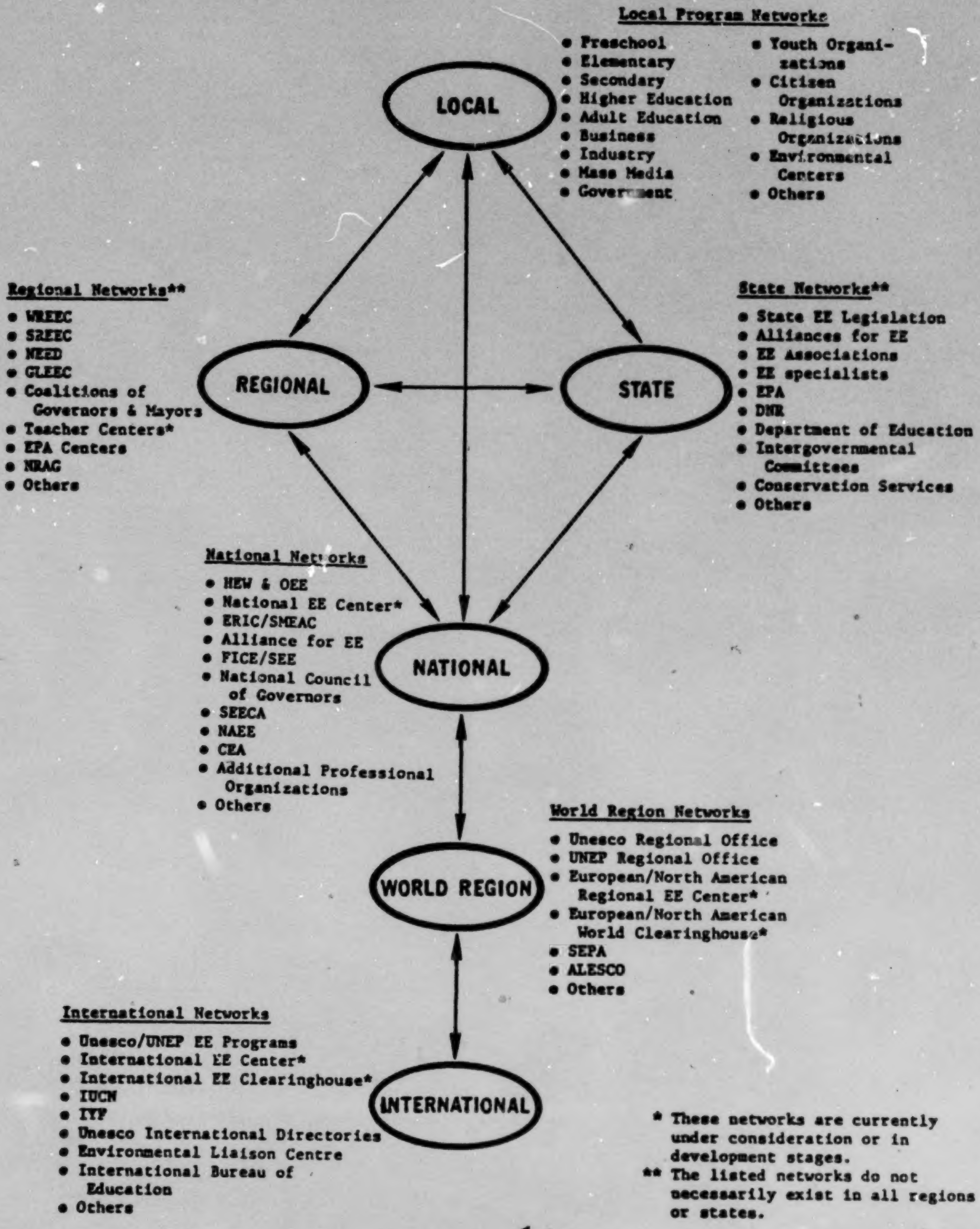

Local
State
Regional
United States
Intranational Structures
Member Nations
WORLD REGION: Europe & North America
WORLD REGION: Latin America & Carribean
WORLD REGION: Africa
UNESCO
WORLD REGION: Asia
WORLD REGION: Middle East
Intranational Structures
Member Nations
Intranational Structures
Member Nations
Member Nations
Intranational Structures
Member Nations
Intranational Structures

Figure 5. A Potential Environmental Education Networking System for the United States



Local Program Networks

- Preschool
- Elementary
- Secondary
- Higher Education
- Adult Education
- Business
- Industry
- Mass Media
- Government
- Youth Organizations
- Citizen Organizations
- Religious Organizations
- Environmental Centers
- Others

Regional Networks**

- WREEC
- SREEC
- NEED
- GLEEC
- Coalitions of Governors & Mayors
- Teacher Centers*
- EPA Centers
- NRAG
- Others

State Networks**

- State EE Legislation
- Alliances for EE
- EE Associations
- EE specialists
- EPA
- DNR
- Department of Education
- Intergovernmental Committees
- Conservation Services
- Others

National Networks

- HEW & OEE
- National EE Center*
- ERIC/SMEAC
- Alliance for EE
- FICE/SEE
- National Council of Governors
- SEECA
- NAEE
- CEA
- Additional Professional Organizations
- Others

World Region Networks

- Unesco Regional Office
- UNEP Regional Office
- European/North American Regional EE Center*
- European/North American World Clearinghouse*
- SEPA
- ALESCO
- Others

International Networks

- Unesco/UNEP EE Programs
- International EE Center*
- International EE Clearinghouse*
- IUCN
- IYF
- Unesco International Directories
- Environmental Liaison Centre
- International Bureau of Education
- Others

* These networks are currently under consideration or in development stages.

** The listed networks do not necessarily exist in all regions or states.

Nonformal EE	Examples of Networking
Youth Organizations, Business, Industry, Labor, Mass Media, Citizen Organizations, Interpretive Centers, Museums, Churches, Government, Others	Facilitates communication through journals, newsletters, conferences, workshops, organizations, lobbying, and boycotts.

The State Node

Most states have a number of organizations and institutions which inform people about environmental concerns. These institutions and organizations should be working together to reach an even wider audience. Possible models for stimulating networks on the state level are exemplified below. Each of the examples is now operating at least one state.

Nongovernmental Models	Examples of Networking
Pennsylvania and Illinois State Alliances for EE, State Public Action Groups and/or Conservation Societies, State Universities and Colleges, State EE Associations, Others	Brings together diverse groups with common EE concerns; Human and natural resource surveys and research projects.

Governmental Models	Examples of Networking
California Conservation Service, State Intergovernmental Committee on Education (SICE), State EE Specialists in the Department of Education and/or Natural Resources, Environmental Protection Agency (EPA), Department of Natural Resources (DNR), Department of Education, Others	Provides educational resources and opportunities to develop and implement EE projects and programs; Coordinates efforts through institutional arrangements.

The Regional Node

Organizations have often cooperated in environmental matters on a regional level. Such organizations are now involved in environmental programs that are successfully coordinating EE interests. These models serve as examples for other areas of the country to link resources and information. For instance, SREEC is composed of states from the southern region and serves to act upon their common environmental interests. Other regional examples are:

Regional Institutional Arrangements	Examples of Networking
Northeastern Environmental Education Development (NEED), GLEEC, WREEC, Northern Rockies Action Group (NRAG), Others	Facilitates communication between state and local practitioners within the region.

Regional Governmental Institutional Arrangements	Examples of Networking
Coalitions of Governors and Mayors	Links state and local governments.
Federal Government Regional Institutional Arrangements	
EPA, Regional Teacher Centers*, Others	Facilitates research development; Disseminates EE projects and programs

*In development stages

The National Node

Over the last ten years, concerns with environmental issues have redirected a number of national organizations to conserve resources and improve the environment. Because these organizations have diverse purposes, there is a need for institutionalized communication links between them. The following are examples of existing and planned national organizations that are channeling efforts into an EE network:

Nongovernmental Institutional Arrangements	Examples of Networking
Alliance for Environmental Education, NAEE, CEA, Additional Professional Organizations, National Council of Governors, Others	Facilitates communication between state and local practitioners throughout the nation.
Government Institutional Arrangements	
FICE, HEW, OEE, FICE/SEE, National EE Center*, Others	Links federal projects and agencies specifically interested in EE.
ERIC	Provides EE information through a computer retrieval system.

*Under consideration.

The Unesco World Region Node

In an effort to strengthen EE internationally, Unesco and UNEP established EE offices in each region of the world. The Unesco world region node should enhance communication between the international and national levels through clearinghouses and EE centers, such as the ones recently established in Africa and Latin America. Some of the institutional arrangements working to link efforts on the world region level are listed below.

International Nongovernmental Institutional Arrangements	Examples of Networking
Science Education Programme for Africa (SEPA), Arab League Educational, Cultural, and Scientific Organization (ALESCO), Others	Facilitates coordination of newsletters, planning sessions, etc. through regional offices.
International Governmental Institutional Arrangements	
Unesco Regional Offices, UNEP Regional Offices, Europe, and North American Unesco EE Center*, Others	Facilitates coordination of newsletters, planning sessions, etc. through regional offices.

*Under consideration.

The International Node

There are many international organizations and institutions with EE interests. Unesco and UNEP's recent activities in furthering global efforts in EE have resulted in major conferences, the establishment of a world directory on EE literature, and the creation of a computerized world bank of names of EE practitioners and organizations. As suggested in the Tbilisi recommendations, an international EE Center should be established to aid in linking the international node with all other nodes.

International Nongovernmental Institutional Arrangements	Examples of Networking
International Union for Conservation of Nature and Natural Resources (UNCN), International Youth Federation (IYF), Environmental Liaison Center*	Facilitates communication through newsletters, publications, committees, and research.
International Governmental Institutional Arrangements	
Unesco-UNEP EE Programs, International Bureau of Education (IBE), International EE Center/Clearinghouse*	Facilitates communication through newsletters, directories, publications, meetings, funding, and research.

*Under consideration.

Institutional arrangements alone do not assure a viable network for EE. Institutions and organizations become a network when readily accessible and effective communication channels exist among them. The communication channels, or linkages, should satisfy two needs. First, institutions and organizations within each node should interact and communicate. Second, institutions and organizations in a particular node should interact with those in other nodes. Through a collective effort of the people who comprise organizations, we need to communicate both within and between nodes.

There are numerous methods with which to link institutions and organizations (Figure 6). Figure 7 details some of the methods found useful at all nodes.

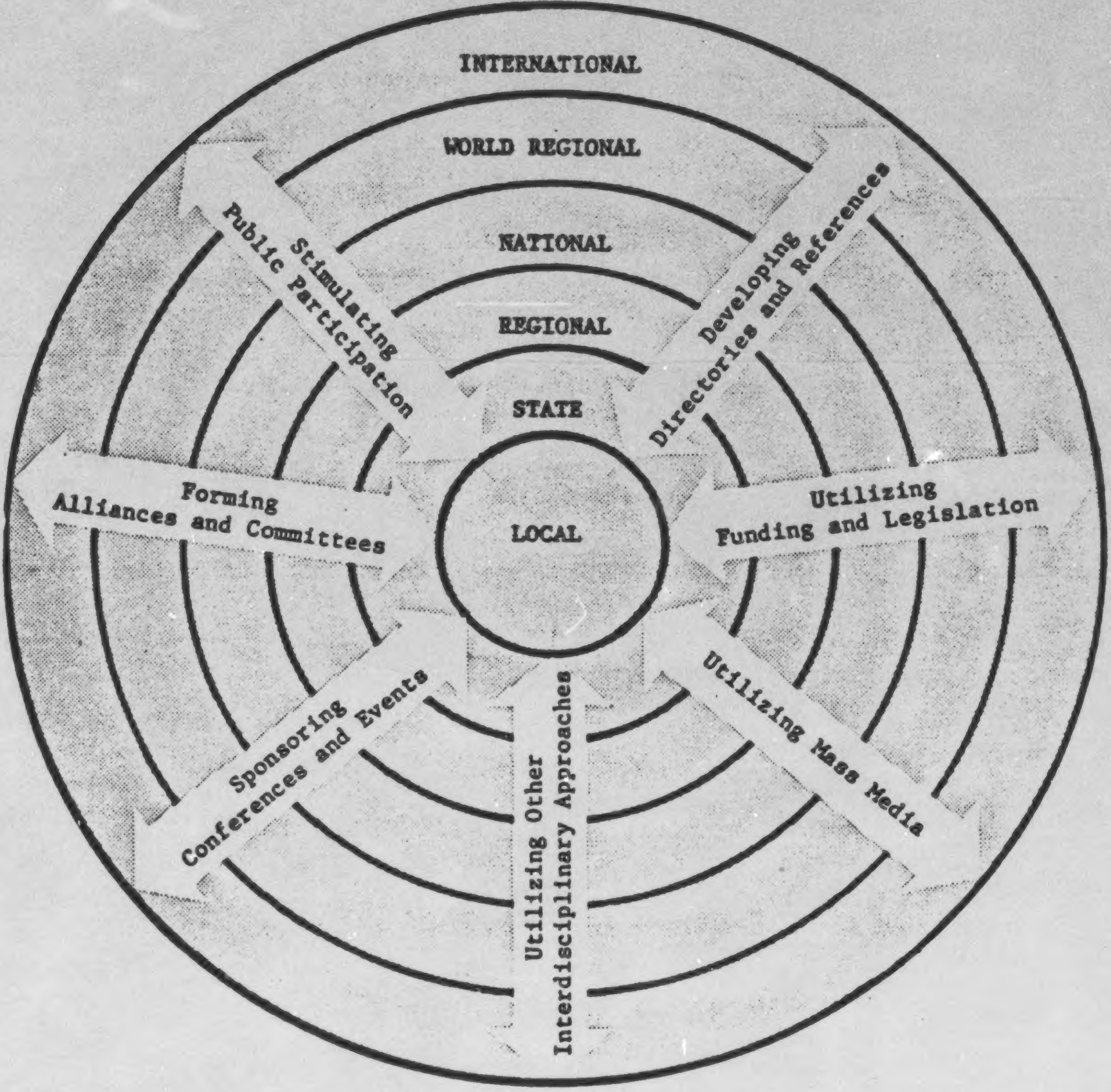

INTERNATIONAL
WORLD REGIONAL
NATIONAL
REGIONAL
STATE
LOCAL
Stimulating Public Participation
Developing Directories and References
Forming Alliances and Committees
Utilizing Funding and Legislation
Sponsoring Conferences and Events
Utilizing Other Interdisciplinary Approaches
Utilizing Mass Media

Figure 6.--Methods of Linking and Strengthening Each Node

Figure 7. Some Methods for Linking Institutions and Organizations

1. DEVELOPING DIRECTORIES AND REFERENCES SOURCES
   - International EE Directories (Unesco)
   - Proposed National EE Center
   - ERIC/SMEAC
   - EE Coordinators
   - Clearinghouses

2. UTILIZING THE MEDIA
   - Films, books
   - Radio/TV
   - Newsletters and Newspapers
   - Magazines and Journals

3. FORMING ALLIANCES AND COMMITTEES
   - Alliance for EE
   - FICE/SEE
   - State and local coalitions

4. SPONSORING CONFERENCES AND SPECIAL EVENTS
   - Earth Day/Sun Day
   - Workshops/Seminars
   - Ecofilm Festivals

5. UTILIZING FUNDING AND LEGISLATION
   - NEPA
   - EE Act of 1970
   - U.S. Office of EE funding projects
   - State legislation

6. STIMULATING GENERAL PUBLIC PARTICIPATION
   - Community Projects
   - Public hearings
   - Boycotts

7. UTILIZING OTHER INTERDISCIPLINARY APPROACHES
   - Teacher exchange programs
   - Collaborative educational efforts

We should consider the unique conditions of a situation in determining which methods best link any institutions and organizations. These linkages are more effective when integrated with institutional and organizational functions.

Another important problem centers around national leadership. To help coordinate all of the significant EE efforts being employed at the regional, state, and local nodes, we should have additional leadership from the national node, such as the establishment of a National EE Center discussed at the National Leadership Conference (Washington, D.C., 1978). At the same time, linkages between the national and international nodes should be strengthened in order to facilitate the exchange of ideas and information with people on other continents. Our national EE strategy should provide for the kinds of leadership, institutional arrangements, communication channels and funds needed to address these and other problems.

VI. A PROCESS FOR DEVELOPING A NATIONAL EE STRATEGY

At the Tbilisi Intergovernmental Conference on Environmental Education Dr. Mary Berry stated:

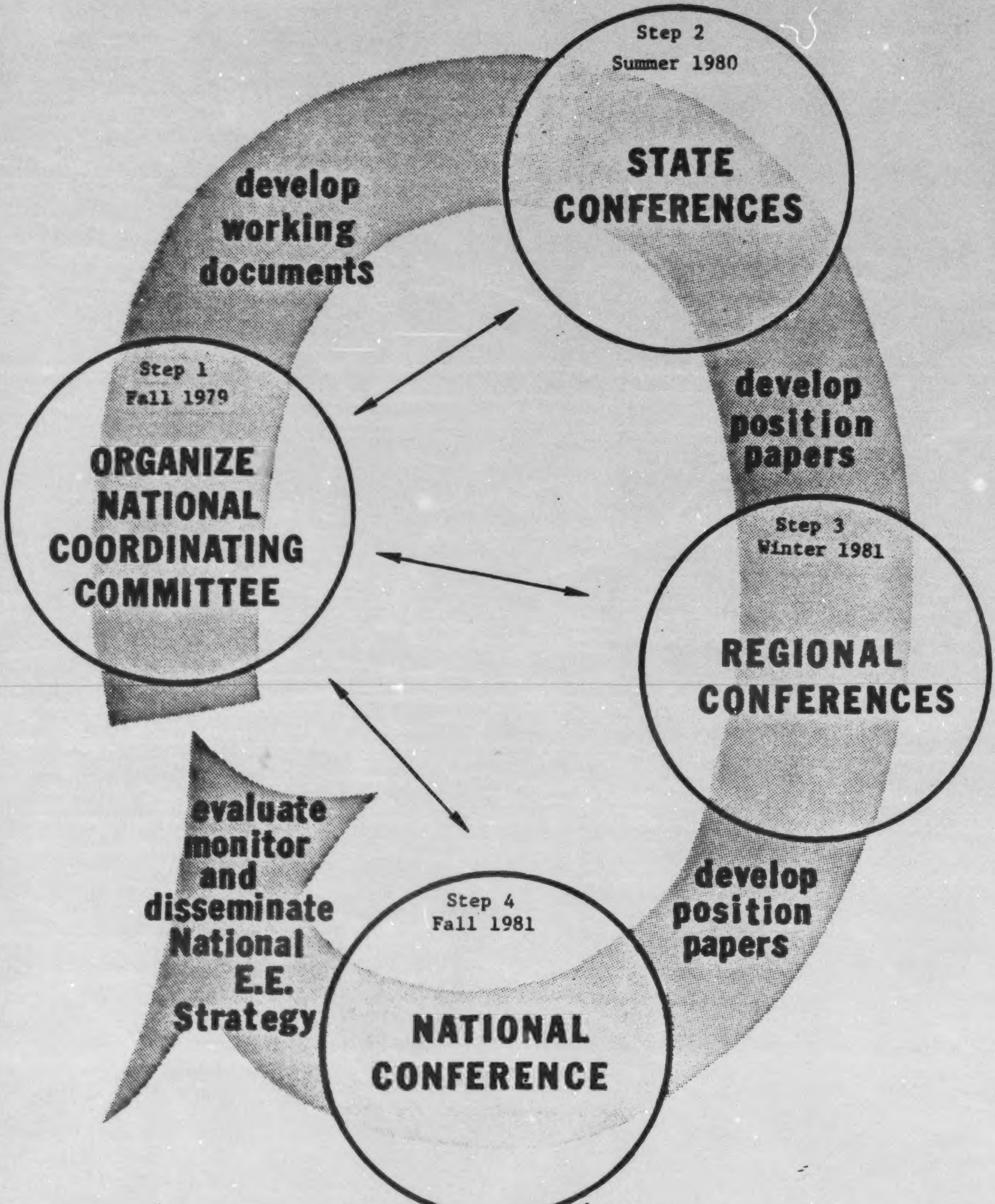
> Environmental problems know no national boundary. We believe that, just as our environment is shared by all, so should information about it be disseminated to people everywhere.... We are here to see that the world's new awareness of the importance of our relationship to the environment suffuses all education, all teacher training, all coursework in whatever subject--and, indeed, all the educational activities of life.[4]

EE is indeed "bodies in need of a head." Consequently, it is important that we work together to formulate a national EE strategy. A strategy will, when implemented, bring direction, strength, and cohesion to the field.

In the development of a national strategy we should recognize the tremendous amount of work that is currently being done and its possible integration into a cohesive whole. We should also recognize that the success or failure of a truly national plan lies primarily in the participation of individuals at each level. We cannot overemphasize the importance of the active involvement of local, state, regional, and national representatives from education, governmental agencies, business, industry, and nongovernmental organizations in this process. Involvement of a cross section of the American public is important to ensure that all viewpoints, including those of minority groups, are taken into full account.

In order to initiate the further development of a national strategy within a feasible time frame, we recommend the following steps be taken (see Figure 8).

Figure 8. Steps in the Process for Developing a National Environmental Education Strategy


Step 2
Summer 1980
STATE CONFERENCES
develop working documents
Step 1
Fall 1979
ORGANIZE NATIONAL COORDINATING COMMITTEE
develop position papers
Step 3
Winter 1981
REGIONAL CONFERENCES
evaluate monitor and disseminate National E.E. Strategy
develop position papers
Step 4
Fall 1981
NATIONAL CONFERENCE

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To facilitate this process we recommend that the OEE consider redirecting its priorities and funds for a period of approximately three years. During this time, the OEE could provide the needed funds to facilitate those projects and processes necessary to plan, conduct, and evaluate the development of a national EE strategy.

Step 1: Organization of a National Coordinating Committee and Support Staff (Fall 1979)

To coordinate state, regional, and national conferences (Figure 8), we recommend the organization of a National Coordinating Committee and support staff. The Committee's purpose should be to oversee the organization of conferences at the various levels and to serve as consultants to both the state and regional conferences.

To develop a national strategy for EE, public or private funds should be sought to employ a staff for a three-year period, with an adequate support budget, to work with the National Coordinating Committee to help implement the proposed strategy. It is clear that documents will need to be prepared for the state, regional and national conferences to provide the appropriate focus on the problem areas identified in this paper, and to help coordinate the activities associated with the development of a national strategy.

The National Coordinating Committee members should:

1. Assess the needs and priorities of EE;
2. Identify pertinent issues and prepare general working documents for consideration at the State Conferences;
3. Prepare a proposed agenda for the State Conferences;
4. Prepare working documents for a National Conference; and
5. Evaluate the national strategy process, monitor the implementation of any recommendations related to the strategy, and disseminate this information.

Step 2: State Conferences (Summer 1980)

In each state, the State Education Agency Coordinator for EE should be responsible for the organization of a State Conference Committee. This committee should provide necessary materials, prepare working documents for presentation at the conference, and recommend directions for the state meetings. It should ensure that at least one session at the conference be devoted to both national and international issues. This committee should invite key local representatives from all sectors to the state conferences.

At the state conference, representatives should:

1. Review the status of EE in the state;
2. Adopt (where necessary) state EE goals and objectives and resolve associated issues;
3. Identify target audiences;
4. Develop (where necessary) state EE action plans including: desired institutional arrangements, communication networks, potential legislation, program development and evaluation, research, and funding, and the assignment of responsibilities and timelines for implementation;
5. Prepare specific working documents for the Regional Conference;
6. Formulate a set of suggested questions and associated documentation to be considered at the Regional Conference;
7. Document and disseminate information concerning what programs, funding, associations, and alliances exist within the state; and
8. Designate representatives to the Regional Conference.

Step 3: Regional Conferences (Winter 1981)

The National Coordinating Committee should assist each region in establishing a Regional Coordinating Committee. The Regional Coordinating Committee should meet to set the direction of the Regional Conference, monitor the development of State Conference documents so that this input can best be injected into the conference structure, prepare working documents, and ensure that at least one session at the conference is devoted to both national and international issues.

Those attending the Regional Conference should:

1. Review the status of EE in the region;
2. Review and discuss state goals and objectives and resolution of associated issues;
3. Establish guidelines for the development of a regional EE plan including: desired institutional arrangements, inter- and intra-regional networks, program development and evaluation, research, funding, and the assignment of responsibilities and timelines for implementation;
4. Develop specific position papers for the region assessing the needs and desires for elements of a national strategy for EE to be presented at the National Conference;

5. Document and disseminate information concerning what programs, funding, associations, and alliances exist within the region; and

6. Designate representatives to the National Conference.

Step 4: National Conference (Fall 1981)

The National Coordinating Committee should take responsibility for facilitation of National Conference activities. The National Conference is intended to represent, through participation and presentation of regional position papers, the needs and desires of the nation. The National Coordinating Committee should prepare working documents for the National Conference. As a conference, the participants need to address the further development of a workable and comprehensive national strategy which considers the:

1. Review of the status of EE in the United States;

2. Adoption of national EE goals and objectives, resolution of associated issues, and implementation of the Tbilisi recommendations, including more active involvement and concern with international issues in EE;

3. Establishment of guidelines for the development of a national EE strategy including: desired institutional arrangements, communication networks at all levels, legislation, program development and evaluation, research, funding, and priorities;

4. Documentation of regional, state, and local activities;

5. Development of implementation measures including specific responsibilities and targets for implementation monitoring of any recommendations;

6. Establishment of a National EE Center;

7. Dissemination of information, documents, and recommendations developed at the conference; and

8. Evaluation throughout the process of developing a national strategy.

Implementation, Monitoring, Evaluation, and Dissemination of Information

It is important that every recommendation adopted at the state, regional, and national conferences be targeted for implementation with a timeline for action. A major responsibility of the National Coordinating Committee and support staff is to disseminate each recommendation to the designated body (target), then establish a plan for, and evaluate each recommendation. The information resulting from these efforts should be disseminated through appropriate channels.

These four steps require vision and initiative on the part of dedicated leaders at all levels. If a national strategy for EE is to succeed in accomplishing the goals established at the Tbilisi Conference, it should also deal with public participation and citizen involvement at all levels. Power to implement the elements of the strategy can come down from enlightened and dedicated leaders, but can also come from grass-roots involvement of the general public. This two-pronged approach is based on the form of government, type of governmental structures, and delegation of powers found in the U.S.

Public participation seeks to facilitate the bringing together of a cross-section of the American public to express their concerns and to become involved in carrying out the national EE strategy. For instance, we can play a significant role in furthering EE programs and policies by:

- Participating in the state, regional, and national conferences mentioned above;
- Helping to plan, coordinate, and carry out the conferences, and helping to follow up with additional activities;
- Introducing EE-related legislation (such as to provide funding, set up an office or center, create a position, etc.);
- Modifying proposed legislation or presenting testimony before hearings; and
- Influencing and participating in EE programs in the local community.

It is important that we actively involve the general public throughout the entire process of assessing needs, formulating goals and objectives, deciding on and implementing a course of action, evaluating that course of action, and revising it where necessary. For any of the components of a national EE strategy to be effective, they must embody the opinions of those who will be affected by decisions relating to daily life styles.

Citizen involvement in institutional arrangements at each level of concern can help to: (1) exchange ideas, assess opinions, and incorporate the views of interested citizens and groups; (2) provide a mechanism for disseminating pertinent information regarding EE programs; and (3) provide a means for formal citizen review and comment. Questionnaires, workshops, newsletters, and public hearings represent several vehicles through which interested individuals and groups can affect the development and implementation of our national strategy for EE.

Only if actions of individuals and groups at the grass-roots level are incorporated into the strategy will it have long-term effectiveness. Recognizing that individual and group involvement are an integral part of the development of a national EE strategy, we have included some personal actions that each of us can take to assist in this process (Appendix A).

VII. SUMMARY

The purpose of this paper was to identify some of the major landmarks that have served EE in the United States and the world, to focus on some of the major problem areas that confront the field of EE, and to suggest a process for developing a national EE strategy to address these areas of concern.

It is within this type of strategy that we can lay the foundation for an environmentally literate citizenry. Continued environmental programs will make it possible for a wider audience to develop new knowledge, skills, values, and attitudes in our drive for a better quality environment.

"Our environment is shared by all, so should information about it be disseminated to people everywhere."[5] Only then will we be able to do our part as a nation to help build a quality life for future global generations.

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[2] From Ought to Action in Environmental Education, A Report of the National Leadership Conference on Environmental Education, ERIC/SMEAC, June, 1978, p. 32.

[3] Presentation at the Intergovernmental Conference on Environmental Education, Tbilisi, USSR, October 14-26, 1977, unpublished.

[4] As quoted in From Ought to Action in Environmental Education, A Report of the National Leadership Conference on Environmental Education, ERIC/SMEAC, June, 1978, p. 8.

[5] Mary Berry, address at the Tbilisi Intergovernmental Conference on Environmental Education, Tbilisi, USSR, October 14-26, 1977, unpublished.

APPENDIX A

SOME PERSONAL ACTIONS TOWARD A NATIONAL ENVIRONMENTAL EDUCATION STRATEGY

1. Organize a coalition for an EE strategy in your community.

   Possible targets: State Department of Education or Public Instruction, school system officials, local environmental organizations, civic groups

2. Become involved with a State Alliance for EE--solicit membership, organize activities, evaluate state needs (state EE plans, legislation).

   Possible targets: State EE specialists, nature centers, civic groups, school systems, university personnel, recognized key people, business, labor, industry, mass media, state government

3. Organize a state meeting for an EE strategy to evaluate state needs and desires.

   Possible targets: State EE specialists, State Alliance for EE, National Coordinating Committee, Regional EE specialists, local environmental groups, state government

4. Keep in touch with regional council activities--or take actions to organize a regional council in your area.

   Possible targets: Recognized key people in the region, state EE consultants, state government, state alliances, other regional councils, federal funding from the OEE

5. Organize a regional meeting for an environmental education strategy to evaluate regional needs and desires and prepare position papers for a national conference on an EE strategy.

   Possible targets: Regional Councils, state governments, state EE consultants, state alliances, Alliance for EE, recognized key people

6. Participate in planning for a National Conference on an EE strategy.

   Possible targets: OEE, FICE, Alliance for EE, Regional Councils, State Alliances, state governments, EE consultants, recognized key people

ADDITIONAL PERSONAL ACTIVITIES

Alliance for EE members: Use your newsletter to spread the word of Alliance activities--write a monthly column. (This has the potential to reach 12 million people, the combined membership of the Alliance affiliates.)

Make use of ERIC system: contribute to it and take advantage of it.

Write in response to the Barton, Jeske, and Pratt article on a National EE Center in the Winter 1979 issues of Trends (Volume 16, No. 1).

Support--and utilize--your local EE coordinator, facilitator or consultant in your school system--or write in support of initiating such a position.

Incorporate EE and internationalism into programs that you are involved with.

Write your congressperson expressing your interest in EE.

Share what you are doing with others in your area--organize training workshops, conferences for local, state, and regional people.

Obtain free curriculum materials, including government publications, for your public library, school library, or learning center.

Contact your newspaper, television and radio station, etc. to give feedback on the stories they choose to cover and the way they handle them.

Provide feedback to others: store owners, movie producers, advertisers, etc.

Write an article about the need and potential for EE and submit it to newsletters of organizations to which you belong.

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THE PRESENT

Lei Lane Bammel and Gene Bammel, *THE USE OF PSYCHOPHYSICAL SCALES IN ENVIRONMENTAL EDUCATION RESEARCH.*

J. Ronald Gardella, *AN ANALYSIS OF TWO STRATEGIES FOR INCREASING TEACHER AWARENESS AND USE OF COMMUNITY RESOURCES.*

Thomas Tanner, *UTILIZING A STATE NETWORK IN CURRICULUM DISSEMINATION.*

Jerry B. Brown and Greg Ballinger, *ASSEMBLING THE SOLAR NETWORK: AN ASSESSMENT OF SOLAR HEATING AND COOLING TECHNOLOGY IN SOUTH FLORIDA.*

Carol A. Lively, *INDIA: AID TO VANISHING WILDLIFE.*

David I. Johnson, *EMPLOYMENT TRENDS FOR A MICHIGAN ENVIRONMENTAL EDUCATION MAJOR.*

THE USE OF PSYCHOPHYSICAL SCALES IN ENVIRONMENTAL EDUCATION RESEARCH

Lei Lane Bammel and Gene Bammel[1]

Abstract. *The purpose of this presentation was to: 1) compare the commonly used category scales with the less familiar magnitude estimation scales, 2) present the rationale, methods, procedures, and advantages of the magnitude scale as well as 3) illustrate its current and future use in research projects.*

Environmental researchers have tried to assign quantitative weights to various events, attitudes, values and beliefs. Traditionally, the construction of such mathematical models has been limited by small social group sampling plus the assumption that the highly reliable category scales are always the appropriate technique. Category scales are a result of psychophysics, the study of the perception of quality, quantity, magnitude, and intensity of physical phenomena. The study of psychophysics also produced magnitude scales which have been presented in the psychosocial literature as appropriate characterization of the mental effect of a stimulus (Sellin, et al. 1964). Since these two measurement methods yield different results, it appears desirable to discuss their relationship as well as to consider the potential use of the lesser known magnitude scales.

Category Scales

Reported attitudinal environmental assessments have primarily relied upon category scales (Bammel, et al. 1977; Bennett, 1975; Millward 1975). Most commonly used have been the Likert Scales and the Semantic Differential Techniques. The Likert scale (Likert 1932)(Figure 1) typically involves selecting an odd integer, anywhere from three to eleven, for response foils--five appears to be the favorite (Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree).

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Fig. 1.--Example of a Likert Scale Item

Response range (number of foils) is determined by the age, educational level, and general condition of the subjects. Numerical values are often later attached to facilitate statistical analysis. Modifications include pictorial, cartoon-type, and ordered alternatives scales.

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Semantic Differentials (Figure 2) are constructed by selecting a number of polar word pairs from a standard "atlas" (Snider and Osgood 1969). Subjects rate a concept by responding to each seven-point bi-polar word pair listed under the given concept.

FOREST

Good ____: ____: ____: ____: ____: ____: ____Bad
Dirty ____: ____: ____: ____: ____: ____: ____ Clean
Boring ____: ____: ____: ____: ____: ____: ____ Exciting

Fig. 2.--Example of a Semantic Differential

Fishbein demonstrated that the Semantic Differential Technique could be adapted to measure both attitudes and beliefs (Fishbein, et al 1967).

Several serious questions have been raised as to the general usability of cateogry scaling techniques. At best, category scales exhibit equal intervals. Schneider reported that the foil responses of "Always," "Very Often," "About as Often as Not," "Seldom," and "Never" produced equal intervals whereas "Always," "Often," "Occasionally," "Seldom," and "Never" did not (Schneider 1974).

Difficulties surface when numerical values are assigned to the various response foils because "neither the zero nor the unit can be specified in a nonarbitrary way" (Luce, et al. 1963). Technically, category methods ought to be used only when the stimuli can be considered to be ordered, but even then the scale is affected by variability (Stevens and Guirao 1963). Categorization is not necessarily based on quantitative relations. A geologist in categorizing common intrusive igneous rocks does not "measure" but rather "enumerates" the objects. For example, five of the specimens might be granite, two gabbro, and three granite porphyry. Numerous environmental investigations have had frequency tabulations as the primary set of data. This type of data can also be expressed in percents. For example, 50 percent of the rock samples were granite, 20 percent gabbro, and 30 percent granite porphyry. Problems occur when researchers arbitrarily attach numerical values to categories that contain frequency data. Values should only be assigned to stimulus events that can actually be measured. Ordered categories can be established for those measurable stimulus events. Scales can be "purposely ordered quantitatively in terms of an attribute" (Nunnally 1978).

Probably the most significant criticism of category scales is that the response range is quite limited as well as being a product of the experimenter rather than the rater. Internal validity "cannot be claimed for the imposition of a fixed range of category values by the experimenter on the rater's judgment" (Sellin, et al. 1964). These scales are viewed as limited since the response range rarely exceeds a single logarithmic unit.

Because category scales cannot be assumed to produce interval data, one must be careful not to apply parametric statistical methods to non-parametric, non-interval data.

> ...use of data obtained by these (unequal) response categories may result in erroneous and invalid conclusions, especially when parametric statistical methods are employed (Schneider 1974).

Magnitude Scales

The main thrust of this manuscript is to point out that a psychophysical scaling alternative exists and that it can be used in environmental research. Magnitude scales, unlike category scales, are a produce of the rater, product "ratios," have internal validity. Parametric statistics can be appropriate (Luce, et al. 1963; Masuda and Holmes 1967a,b; Sellin, et al. 1964), and past studies have indicated their usefulness in the "complex processes like affective judgment" (Soon 1965). Another advantage is that

> stimuli whose differences are reported to be subjectively equal on the category scale are separated by progressively larger distances on the magnitude scale (Soon 1965).

This repeated finding of non-linearity is interesting since both scales have reported high degrees of reliability. Most researchers have contended that the category scale is a logarithmic function of the corresponding magnitude scale, while one prominent psychophysicist has amassed evidence supporting a power function (Luce, et al. 1963).

A specific technique called the "Magnitude Estimation Scale" has been successfully applied to psychosocial phenomena (Holmes and Rahe 1967). Historically, its origins are rooted in the confusability of physical events being proportional to the physical magnitude of the events--expressed in Weber's Law, a law of comparative judgment. In 1860 Fechner developed the idea further to state that the psychological measure of intensive physical variables is the logarithm of the physical stimulus. The resulting scale was based on units of variability and is referred to as the JND, just-noticeable difference scale. A later idea of assigning quantitative values to psychological events that were void of an intrinsic physical counterpart was developed by Thurstone in 1927. Since then, Ekman's Law of Relative Variability from the field of metric psychophysics has been extended into the non-metric field of psychosocial phenomena.

Construction of Magnitude Estimation Scale. Once the variable to be rated is determined, a list of stimulus events or situations is then established. The variables can be of a physical or social nature. One stimulus can be assigned a particular response value so that the subjects (Ss) can estimate the value of other stimulus items by how they compare proportionally to the given standard, called a "module." To make computations easier for the Ss, values of 1, 10, or 100 have often been utilized (Luce, et al. 1963). Some attitudinal or other situations might however require a larger standard value; 500 has been successfully used (Holmes and Rahe 1967). This scale, for example (Figure 3), could be used to determine the relative importance attached to a number of environmental issues.

Environmental Issues	Values
1. Clean air	500
2. Clean water	___
3. Nuclear power plants	___
4. Alaskan wilderness areas	___
5. International fishing borders	___
6. Endangered species	___
7. Etc.	___

Fig. 3.--Example of an Estimated Magnitude Scale

Data could be collected from various groups (politicians, the general public, identified environmentalists), with statistical analysis applied to determine whether or not significant differences occurred between the groups' values.

Use of Magnitude Estimation Scales. A nine-point Likert scale ("extremely aids" to "extremely detracts") instructed responders to rate how given factors affected their personal hunting experience. Results indicated the top five factors to be 1) nature appreciation, 2) escapism, 3) companionship, 4) shooting, and 5) skill (Potter, Hendee and Clark 1973). A reader of the above data would not be able to determine the difference or distance between ranks. Is it that all five were very closely spaced together in the responders' minds, or could it be that significant gaps separated each factor? Managers involved with the hunting controversy have frequently referred to that study as a means of indicating that "harvesting" (killing, ranked eighth), is not as important to hunters as anti-kill and anti-hunters assumed. But the data did not indicate whether or not significant differences occurred between the various items. The precise value placed on each item is still not known.

When the Bammels applied the magnitude estimation scale to determine why people (N = 190, Males 177, Females 13) liked to hunt, the top five reasons were as follows when "the kill" was assigned a standard value of 500:

1) Like the out-of-doors	816.26
2) Recreation and leisure	608.06
3) Challenge - testing skill	566.63
4) Nature study and seeing animals	563.61
5) Like to shoot	536.62

The following top five reasons resulted when people (N = 30, Males 11, Females 22) who opposed hunting were asked to give values (to the same list with "the kill" scored 500) to reasons why they thought people hunted:

1) The kill	500.00
2) To prove manhood	470.73

3)	Like the out-of-doors	425.76
4)	Like to shoot	417.00
5)	Challenge - testing skill	397.79

Non-hunters, those who do not hunt for other reasons than opposition to the activity, also responded to the scale. Statistical procedures were able to identify which "reasons" drew significantly different responses from the three groups.

Currently, the authors of this paper are employing the magnitude estimation scale on a McIntire-Stennis Forestry Research Grant to determine the relative importance of various outdoor recreational activities. The exact directions are as follows:

> You are asked to rate a series of outdoor recreational activities as to their relative degree of importance. In scoring, use all of your experience in arriving at your answer. This means personal experience, where it applies, as well as what you have learned to be the case for others. Therefore, strive to give your opinion of the *average* degree of importance for each activity, rather than the extreme.
>
> Primitive camping has been given an arbitrary value of 500. As you complete each of the remaining activities think to yourself: "Is this activity of more or less importance than Primitive camping?" If you decide that the activity is more important, then choose a proportionately larger number and place it in the blank directly preceding the activity in the column marked "VALUES." If you decide that the activity is less important, then choose a proportionately smaller number. If the activity is equal in importance to Primitive camping, record the number 500 opposite the event.

The above directions called for the score on the estimated value to be placed before the item instead of after for greater ease of responding.

Statistical Treatment. It is possible that at times the data might need to be "normalized" depending upon the response range. It was necessary in the hunting study since the groups varied so widely with values ranging from 0 - 1,000 or more.

The general consensus is that the geometric mean is the best average statistic (Sellin, *et al*, 1964), since it discounts the extreme score while considering the distribution of scores, when the distribution of the subjective magnitude scores is logarithmic. Although "the pragmatic value of the arithmetic mean was obtained in spite of the demonstrated appropriateness of the geometric mean" (Masuda and Holmes 1967), the use of the geometric mean in reported studies did not improve associations between the variables. Therefore, the additional calculation efforts necessary for the geometric mean do not appear to improve the quality of results sufficiently to warrant its use. Furthermore, correlation coefficients between different subgroups were almost identical, in the

Masuda and Holmes study, whether calculated with parametric Pearson's r or non-parametric Spearman's rank order r.

Parametric statistics have been recommended on the basis that one is dealing with a ratio scale in subjective magnitude estimations. However, the scoring in the one study which compared the two methods indicated that the correlation coefficients were "almost identical whether calculated as parametric Pearson's r on mean item scoring or non-parametric Spearman's rank order r" (Masuda and Holmes 1967).

The final choice of a statistical tool will of course be determined by the degree of knowledge and conservatism of the researcher, the topic investigated, as well as the size and type of group (random sample or not) investigated.

Summary

Likert, Semantic Differential, and other category scales have extensively been used in past environmental investigations. Conclusions and/or recommendations have sometimes been based on non-interval scales or on results yielded by inappropriate statistical methods. Category scales should use non-parametric tests. The Magnitude Estimation Scale allows the rater to establish the response range, is a ratio scale, and can be treated with parametric methods of statistical analysis.

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AN ANALYSIS OF TWO STRATEGIES FOR INCREASING TEACHER AWARENESS AND USE OF COMMUNITY RESOURCES

J. Ronald Gardella[1]

Abstract. *This study provides some insight into the educational use of community resources. It recognizes the practice as pedagogically sound, advocated by environmental educators, yet underutilized by teachers. It empirically examines the effect of the two most common methods for encouraging teachers to use community resources, the Resource Workshop and the Resource Guide, on teacher awareness and use of community resources. It establishes both methods as effective for increasing teacher use of community resources and the Resource Workshop as effective for increasing teacher awareness of community resources. The study indicates that the major deterrents to teachers' using community resources are hindering administrative policies, cost of trips, and problems arranging transportation.*

Introduction

Every community contains a wealth of resources that can provide direct and relevant experiences for students at all grade levels. Understanding the intricacies of communities and their associated environments is necessary if the community and environments are to be maintained successfully. This is particularly important today with the threat to people and their communities imposed by the high level of environmental degradation. The educational use of communities and their resources is a pedagogically sound practice that supports this understanding (Gardella, et al. 1973).

The educational use of community resources has been a practice with varying degrees of popularity since the time of Pestalozzi (Olsen 1956). Educational reasons given in defense of this practice have been to provide opportunities for direct experiences (Hammerman and Hammerman 1964) and educational experiences that are relevant to the lives of students (Clapp 1939). Historically, the greatest support for community resource-use education came during the period of the community school movement (Clapp 1939; Hammerman and Hammerman 1964; Krug 1953; Seay 1953). Since that time outdoor educators have continued to recommend the practice (Clark 1943; Sharp 1948). Defined advocacy for community resource-use education has been offered by the environmental education movement since its rise in the late 1960s. This advocacy is documented in publications such as Environmental Education Resources by the United States Department of the Interior and the National Education Association (1972), and by environmental educators such as Ambry (1970), who states:

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> The aim of environmental education is to make use of the wealth of resources in every community which can reinforce and contribute to the learning process...to add understanding to the students' awareness of the variety and complexity of life around them..., and above all, to make the educational process relevant to the student's needs both immediate and future (p. 5).

Teachers are recognized as critical to the educational use of community resources; programs describe a variety of strategies to encourage teachers to use resources (Ayers 1956; Sharp 1948; Shultz 1975; Speigner 1961). In most of the program efforts, teacher use of community resources has been emphasized, while teacher awareness and attitudes toward community resource-use received little attention.

The reluctance of teachers to use community resources has been noted by numerous writers and researchers (Bard 1952; Hug 1964; Olsen 1963; Strohben 1952). D. Hammerman (1954) notes that "there was a dearth of experimental studies in this area" (p. 46). Hug (1964), and Olsen and Bharnuratna (1956) among others, recommended that further research be done regarding the educational use of community resources.

The purpose of this research was to respond to this need for further research on teacher use of community resources (Olsen 1956) by comparing two techniques that have been purported to increase teacher use of community resources by Brown, Lewis and Harcleroad (1959). These techniques are the community resource workshop and the community resource guide. They are the two most frequently reported methods for encouraging teacher use of community resources. More specifically, this study sought to compare the effect of the resource workshop and resource guide on teacher awareness and use of community resources.

The study further investigated selected teacher attitudes toward community resource use and the degree to which seven deterrents to the use of community resources most frequently reported in the work of Hug (1964), Norberg (1952), Sharp (1948), Palmer (1952), Ayers (1956), and others affected the teachers in this study.

Hypotheses

Hypothesis 1 (Awareness): New Jersey elementary school teachers who have received training in inventorying and developing learning strategies for selected resources of a New Jersey county in a resource guide development workshop will be aware of the resources of that area to a significantly greater degree than would a similar group of teachers who receive no such training, but are given the developed guide to the same resources.

Hypothesis 2 (Use Hypothesis): New Jersey elementary school teachers who have received training in inventorying and developing learning strategies for selected resources of a New Jersey county in a resource guide development workshop will use the resources of that area to a significantly greater degree than would a similar group of teachers who receive no such training, but are given the developed guide to the same resources.

Research Question #1: Will elementary teachers in Monmouth County, New Jersey change their attitudes toward the educational use of community resources as a result of training in a community resource guide development workshop or through the use of an educational guide to community resources?

Research Question #2: Will elementary teachers in Monmouth County, New Jersey increase their understanding of techniques for the educational use of community resources as a result of training in a community resource guide development workshop or through the use of an educational guide to community resources?

Research Question #3: What major deterrents to the educational use of community resources will the elementary school teachers associated with this research project identify?

Methods

The study was limited to 72 elementary school teachers. All elementary school teachers in Monmouth County, New Jersey, were invited to participate in the study. Every fifth applicant was accepted until the 72 participant maximum was reached.

The community and county resources employed in this study were in Monmouth County, New Jersey. Data for the study were collected over a two-year period (April 1972 - June 1974).

Research Design: The research design is a pretest-posttest control group design utilizing two treatment groups (Fig. 1).

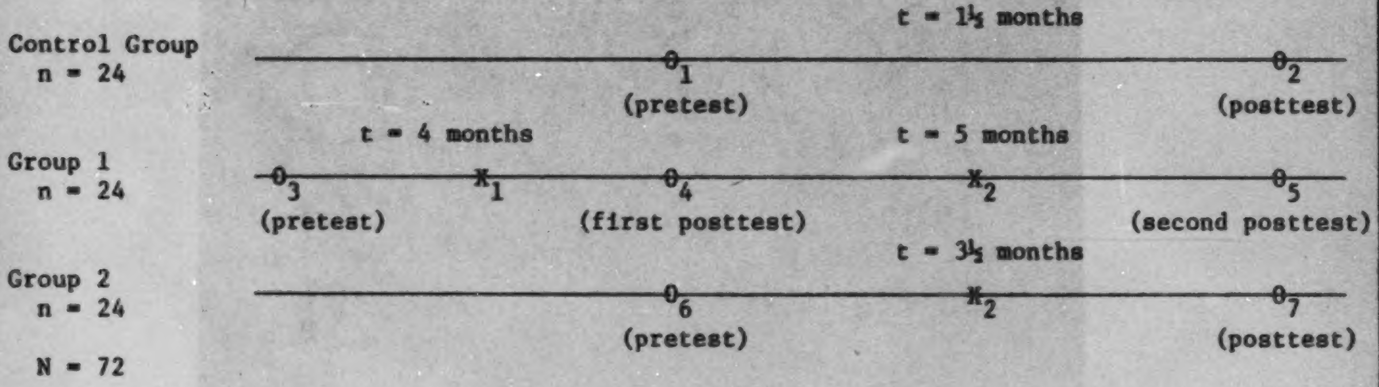
Treatment

The Resource Workshop treatment (X_1) was a 30-hour course of instruction developed and taught by the researcher. It included instruction in the philosophical foundations for the educational use of community resources; group and individual work in developing strategies for use of community resources; community resource visits with demonstrated use of the resources by the researcher; and presentation of resources identified and annotated by each participant to the group.

The Resource Guide (Gardella, et al. 1973) used in this study was developed as a result of the resource workshop given to Group 1. It is an organized listing of 160 community resources of Monmouth County. New Jersey. The listed resources are classified under the categories of Cultural, Economic, Historical, Governmental and Science/Natural History. They are indexed twice, alphabetically and by category.

The unit of the resource guide is the individual resource entry. Each entry provides information about the location, facilities available, costs, limitations to use of the resource contact

Figure 1. Flow Chart for the Research Design to Compare Two Strategies for Increasing Teacher Awareness and Use of Community Resources.


t = 1½ months
Control Group
n = 24
O_1
(pretest)
O_2
(posttest)
t = 4 months
t = 5 months
Group 1
n = 24
O_3
X_1
O_4
X_2
O_5
(pretest)
(first posttest)
(second posttest)
t = 3½ months
Group 2
n = 24
O_6
X_2
O_7
(pretest)
(posttest)
N = 72

O_n = Administration of the test instrument

X_1 = Resource guide development workshop

X_2 = Use of resource guide

n = Sample size

N = Population size

t = Elapsed time

person, and suggestions for educational use. The "Suggestions for Educational Use" includes educational objectives, pre-visit activities, on-site activities, and follow-up activities. All activities are consistent with the objectives posed for the resource. Evaluation for the use of the particular resource is inherent in the objectives listed for the entry.

Instrumentation

The test instrument used in this study was developed specifically for this study and is called the Resource Inventory. Part I of the instrument is devoted to demographic data of the participants (sex, teaching experience, professional training, interests, etc.). Part II measures the participants' awareness of community resources by having them respond to an awareness scale, or scale of familiarity, for each of 100 representative community resources and the participants' use of community resources by asking the participants to indicate the number of times they used each of the 100 resources listed. It also asks some cognitive and attitudinal questions related to the use of community resources (Likert scale used), and asks participants to rank seven deterrents to the use of community resources according to what they perceive to be the most limiting.

Face validity of the test instrument was established by a jury of professional educators. Test-retest reliability for the instrument was established on the basis of control group pretest-posttest comparison.

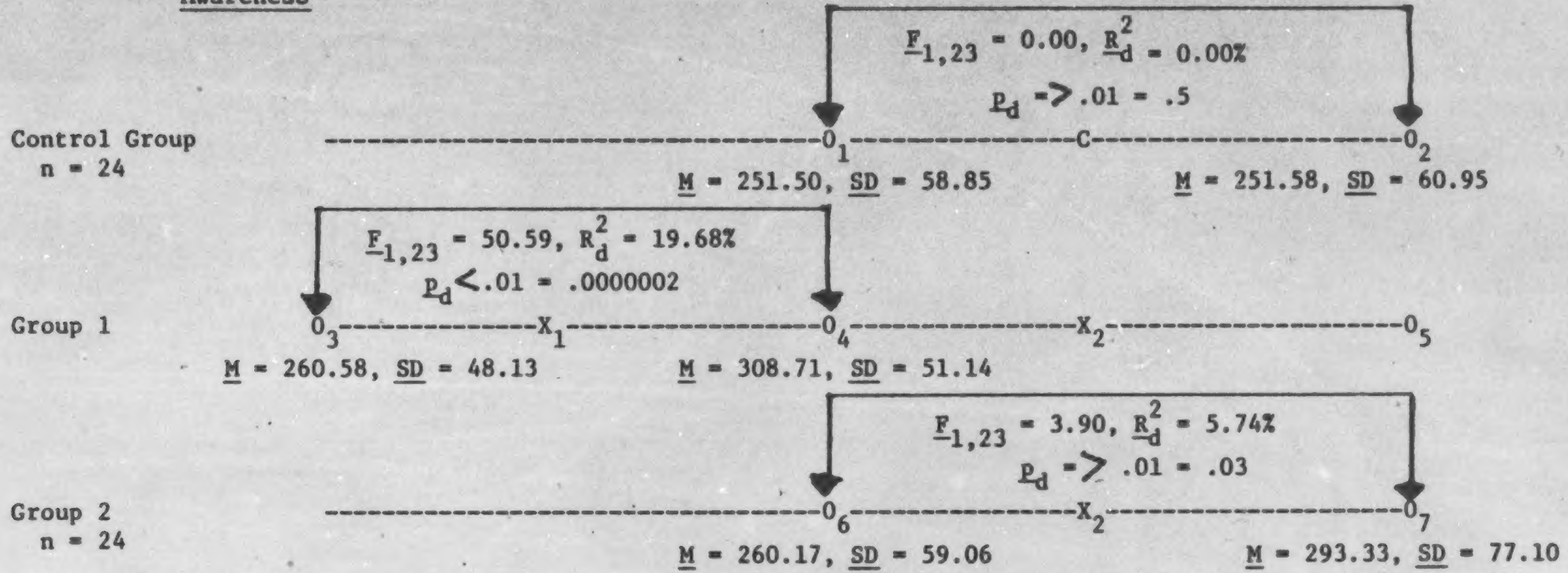
Data were analyzed by multilinear analysis using program Linear. Full and restricted models using person vectors were included in the analysis. Person vectors were used to account for individual variance in repeated measures.

Results

The statistical results of the study are presented in Figures 2 and 3 and are interpreted for each hypothesis and research question posed. The full model yields a value of $\underline{R}_f^2$ which is the amount of variance accounted for by the predictors: pretest, posttest, and person variables.

> A restriction was placed on the full model which results in a model which uses only person vectors as predictor variables on the criterion. The restricted model yields a value of $\underline{R}_r^2$ which is the amount of variance accounted for by the persons alone. The amount of variance accounted for by treatment is the difference between $\underline{R}_f^2$ and $\underline{R}_r^2$. The resulting value of $\underline{R}_d^2$ is then most meaningful when compared to the total variance which was unaccounted for by the full model and available beyond that attributed to the person vectors (100 - $\underline{R}_r^2$).

Figure 2. Comparison of Control Group, Group 1, and Group 2 Observations on the Dependent Variable--Awareness[1]


$\underline{F}_{1,23} = 0.00$, $\underline{R}^2_d = 0.00\%$
$\underline{p}_d \geq .01 = .5$
Control Group
n = 24
0_1
C
0_2
$\underline{M} = 251.50$, $\underline{SD} = 58.85$
$\underline{M} = 251.58$, $\underline{SD} = 60.95$
$\underline{F}_{1,23} = 50.59$, $R^2_d = 19.68\%$
$\underline{p}_d < .01 = .0000002$
Group 1
0_3
X_1
0_4
X_2
0_5
$\underline{M} = 260.58$, $\underline{SD} = 48.13$
$\underline{M} = 308.71$, $\underline{SD} = 51.14$
$\underline{F}_{1,23} = 3.90$, $\underline{R}^2_d = 5.74\%$
$\underline{p}_d \geq .01 = .03$
Group 2
n = 24
0_6
X_2
0_7
$\underline{M} = 260.17$, $\underline{SD} = 59.06$
$\underline{M} = 293.33$, $\underline{SD} = 77.10$

Legend

0_n - Administration of test instrument

X_1 - Resource guide development workshop

X_2 - Use of resource guide

C - No treatment related to the research

(Note 1: Criterion score for awareness = 500)

$\underline{F}_2$ - $\underline{F}$-ratio value

$\underline{R}^2_d$ - Differential variance ($\underline{R}^2_f - \underline{R}^2_r$)

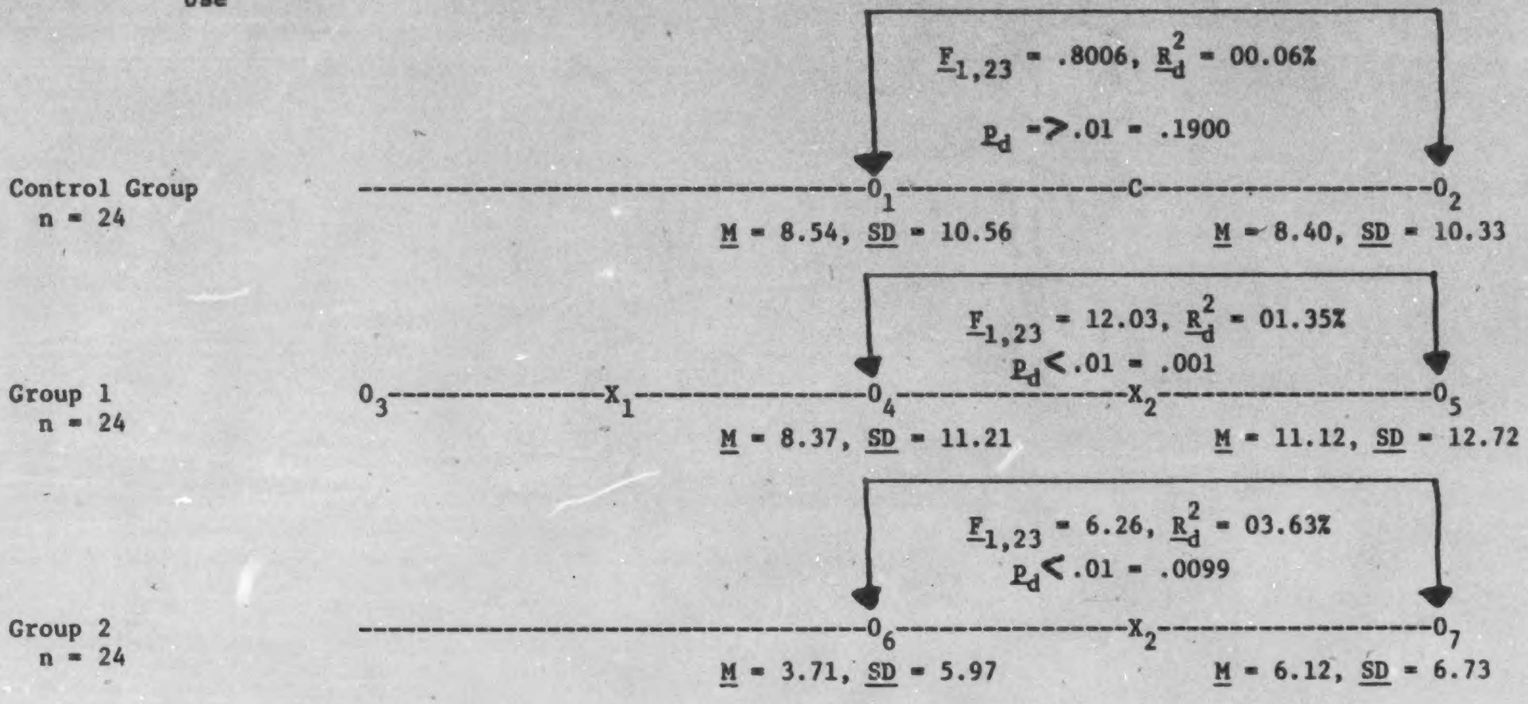
$\underline{p}_d$ - Directional probability level

$\underline{M}$ - Mean

$\underline{SD}$ - Standard deviation

α = Alpha level of .01

Figure 3. Comparison of Control Group, Group 1, and Group 2 Observations on the Dependent Variable—Use[2]


$\underline{F}_{1,23}$ = .8006, $\underline{R}_d^2$ = 00.06%
$\underline{p}_d$ => .01 = .1900
Control Group
n = 24
0_1
C
0_2
$\underline{M}$ = 8.54, $\underline{SD}$ = 10.56
$\underline{M}$ = 8.40, $\underline{SD}$ = 10.33
$\underline{F}_{1,23}$ = 12.03, $\underline{R}_d^2$ = 01.35%
$\underline{p}_d < .01$ = .001
Group 1
n = 24
0_3
X_1
0_4
X_2
0_5
$\underline{M}$ = 8.37, $\underline{SD}$ = 11.21
$\underline{M}$ = 11.12, $\underline{SD}$ = 12.72
$\underline{F}_{1,23}$ = 6.26, $\underline{R}_d^2$ = 03.63%
$\underline{p}_d < .01$ = .0099
Group 2
n = 24
0_6
X_2
0_7
$\underline{M}$ = 3.71, $\underline{SD}$ = 5.97
$\underline{M}$ = 6.12, $\underline{SD}$ = 6.73

Legend

0_n - Administration of test instrument

X_1 - Resource guide development workshop

X_2 - Use of resource guide

C - No treatment related to the research

(Note 2: Criterion score for use is open-ended)

$\underline{F}_2$ - $\underline{F}$-ratio value

$\underline{R}_d^2$ - Differential variance $(\underline{R}_f^2 - \underline{R}_r^2)$

$\underline{p}_d$ - Directional probability level

$\underline{M}$ - Mean

$\underline{SD}$ - Standard deviation

α = Alpha level of .01

Hypothesis #1 (Awareness): Participants indicated a significant increase in awareness of community resources as a result of the resource workshop. The availability and use of the resource guide resulted in no significant increase in awareness of community resources.

Simply giving the resource guide to teachers did not increase their awareness of community resources in the county. It is inferred that it is not necessarily prerequisite for a teacher to be aware of all the resources in a resource guide in order to use one or a few of the listed resources. The teacher may selectively review only one or a few of the listed resources. Therefore, if raising teacher awareness of community resources is desired, it seems that training similar to that obtained in a resource workshop would be recommended.

Hypothesis #2 (Use): A significant increase in teacher use of community resources occurred as a result of both the resource workshop and the availability and use of the resource guide. The resource workshop accounted for 34.6 percent of the total variance above that attributed to subject variability. The availability and use of the resource guide accounted for only 20 percent of the variance above and beyond that attributed to subject variability. It seems that the resource workshop may be a more effective strategy for increasing teacher use of community resources. Given that both strategies are effective for increasing teacher use of community resources, the commitment to use community resources and the support available in the local district would dictate which approach to implement.

Research Question #1: The resource workshop accounted for a statistically significant difference in 3 of 11 statements that explored a change in teacher attitudes about the educational use of community resources. The availability and use of the resource guide accounted for a statistically significant difference in 2 of 11 statements asked. Their results do not indicate an overall positive change in attitudes about the use of community resources.

Research Question #2: Teacher understanding of the techniques for use of community resources was significantly increased by both the resource workshop and the availability and use of the resource guide. On the basis of within-group comparisons, the resource workshop accounted for a proportionately higher amount of group variance (53.33 percent) of the total available variance (58.79 percent) than did the availability and use of the resource guide (36.74 percent). Given the effectiveness of both approaches, it would seem that the commitment to use community resources and the support available in the local district would dictate which approach to implement.

Research Question #3: Numerous factors dictate why teachers do not use community resources. Beyond the awareness and knowledge of techniques for the educational use of community resources, the teachers in this study ranked the following deterrents to the use of community resources. The major deterrents were, in descending order, hindering administrative policies, cost of trips, and problems arranging transportation. Of lesser concern, but still limiting, were concern about student safety, lack of teacher planning time, teacher liability, and administrative bias against the use of community resources.

In spite of the deterrents noted by the teachers in this study, an increase in their use of community resources did occur. The use of community resources may well be a function of the commitment of the individual teacher.

Threats to Validity

Empirical research with practicing teachers often suffers the consequences of realistic dimensions that may affect the research to varying degrees. The researcher risked selection bias with the method he had to use in selecting the teachers in the study.

A time disparity that was beyond the control of the researcher existed between control and treatment groups used in this study. This may have posed validity concerns with respect to the teacher use of community resources.

Discussion

Too often the use of community resources suggests a field trip to someplace far removed from the school and community. The teachers in this study came to know and use community resources outside the classroom, on the school grounds, within walking distance of the school, as well as in the immediate community. With growing restrictions on gasoline and school trips, this aspect of community resource use is becoming more important.

Beyond the values reported by this study, it is apparent that the people in the local community were pleased with the school using local resources. It imparted a status to the people in the local community not previously enjoyed. Children viewed their parents and their community in a new and positive light.

Summary

1. Elementary school teachers who received training in inventorying and developing learning strategies for the educational use of community resources in a resource guide development workshop became increasingly aware of the availability of these resources.

2. Teachers' use of community resources was substantially increased by both teacher participation in a resource guide development workshop and being presented with a resource guide.

3. Elementary teachers increased their understanding of techniques for the use of community resources as a result of training in a community resource guide development workshop and through the availability and use of a resource guide.

4. The major deterrents to the use of community resources were, in descending order, (1) hindering administrative policies, (2) cost of trips, and (3) problems arranging transportation. Of lesser concern, but still limiting, were (4) worry about student safety, (5) lack of teacher planning time, (6) teacher liability, and (7) administrative bias against the use of community resources.

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UTILIZING A STATE NETWORK IN CURRICULUM DISSEMINATION

Thomas Tanner[1]

Abstract. *The major thesis of this case history is that curriculum developers must discover and utilize a state's existing dissemination network(s) if they are to be successful in teacher education and material dissemination efforts. A secondary thesis is that in a successful program, potential cooperators should have early and significant roles in the decision-making process even though the bulk of the detail work may remain the responsibility of the developer. A tertiary thesis is that the resulting program of teacher workshops should involve participants actively with substantive materials and experiences which they can replicate or adapt in their own teaching. These theses are illustrated in the successful project described herein.*

INTRODUCTION

In 1976, while still living in the Pacific Northwest, this writer published a set of six case studies under the aegis of the National Audubon Society. These were examples of responsible citizen action on environmental issues, prepared primarily for the secondary school level. Grant support had come from Audubon, the U.S. Office of Environmental Education, and the POINT Foundation. For the next year, I was able to initiate no serious dissemination or teacher education programs due to the press of other obligations. Audubon's highly successful publishing business was not geared to this specific type of task. Tentative plans were made for me to provide a workshop for the staff of the Audubon Nature Centers, who in turn could workshop teachers in their own areas. However, budgetary limitations prevented such a program. Consequently, there was a period of one to two years which saw no real program of material dissemination and teacher education.

THE EXISTING STATE NETWORK

When I moved to Iowa State University in 1977, it was with little thought in mind given to this problem. But one of my first Iowa experiences changed that. Duane Toomsen, environmental education consultant for the State Department of Public Instruction, was directing a September workshop to which he kindly invited me. The subject of the workshop was the rationale and use of Project Learning Tree and the Energy Conservation Activity Packets. The former is a K-12 forestry-oriented curriculum meant for infusion into all subject areas; the latter is an elementary school project developed by Iowa's Department of Public Instruction and the state's Energy Policy Council.

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The clientele of this several-day September workshop were representatives of the state's area education agencies (AEA's). These are the agencies which, as in so many states, succeeded the old county school systems, with each such agency incorporating some of the functions and all of the geographic area for several county systems. In Iowa, for instance, there are 15 regional AEA's serving the state's 99 counties. They have three principal charges: first, to act as instructional materials centers for the schools of each region; second, to provide special education services for children with various learning handicaps; third, to provide educational services not falling within the first two categories. These last services are provided by each AEA's Educational Services Division, which tends to be staffed by subject-area consultants who provide short workshops and individual consultation for teachers.

In attendance at the September workshop were three representatives from most of the AEA's: the environmental education consultant from the Educational Services Division, and two teachers from the region whose released time was being subsidized by workshop project funds. Only one or two of the AEA's had a full-time environmental education consultant: most were responsible for one or more other curriculum areas. The workshop staff consisted of the state environmental education consultant (Mr. Toomsen), plus staff from each of the two projects.

After several days of hands-on experience with the projects' materials and techniques, the participants were given workshop time to plan the agendas of their area follow-up workshops, which represented the next phase of the program. These workshops occurred during October and November--15 in number, one per AEA. EAch lasted one full day, from early morning until late afternoon. The teaching staff for each workshop now consisted of the state consultant and the three area representatives, each having assumed one or two lessons from the opening workshop as his or her responsibility. The participants represented the K-12 grade levels, but were overwhelmingly from the elementary schools. They received free copies of the materials, along with a brief introduction to the rationale for each project, and were conducted through one or two sample lessons from each.

These area workshops had been advertised by attractive brochures, prepared by the state consultant, printed by the State Department of Public Instruction, and distributed by the AEA's.

During the remainder of the school year, and into the next, the state and AEA consultants offered one- or two-hour short courses in schools around the state. Frequently, these were schools from which one teacher had attended the area workshop, and had then interested others in her or his school in learning more about the materials and their use. Again, the materials were distributed free of charge at these short courses.

In a meeting in the spring, the state and AEA consultants analyzed the project's first year. The AEA's are relatively new entities, and this was one of their first experiences with this sort of state-wide diffusion project. Generally, they were quite pleased with it. They did express express some concern over the brevity of the in-school short courses, but conceded that they were better than nothing at all. They had also found that the teachers who had been participants in the opening workshop and had taught in the area workshops were not able to act as resource persons thereafter, because of the demands of their classroom duties.

The dissemination network is summarized by Figure 1.

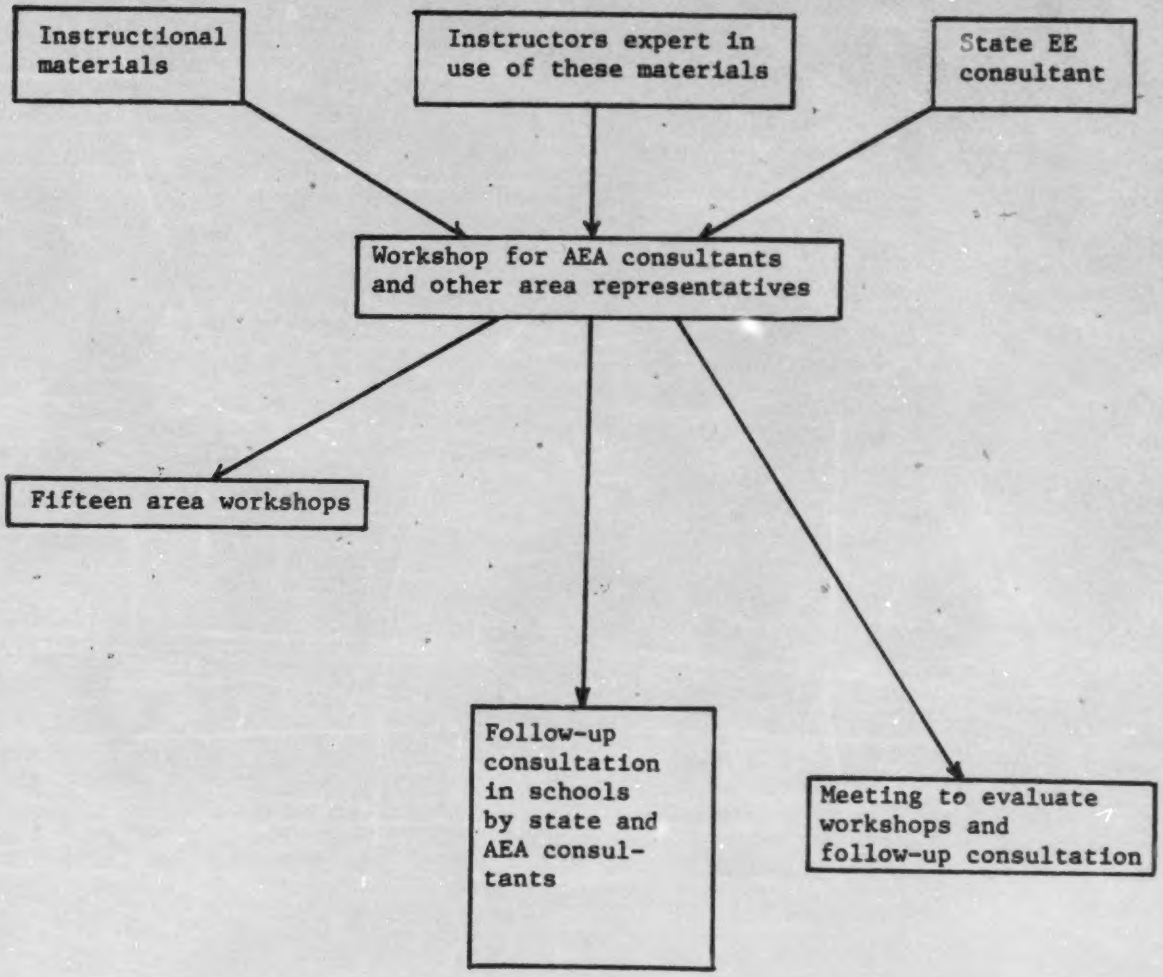
Instructional materials
Instructors expert in use of these materials
State EE consultant
Workshop for AEA consultants and other area representatives
Fifteen area workshops
Follow-up consultation in schools by state and AEA consultants
Meeting to evaluate workshops and follow-up consultation

Figure 1.--The Existing State Network

UTILIZING THE NETWORK

At this point I must return my narrative to the September workshop, and begin to describe another sequence of events simultaneous to, and succeeding, those just described. First, I was favorably impressed by the networking system which I saw being employed. It occurred to me that this same vehicle would be quite appropriate for the Audubon case studies, during the succeeding academic year. Shortly after the opening workshop I proposed the idea to the state consultant, explained the materials and their rationale, and gave him an examination copy of the Instructor's Guide and Student Edition. His reaction was favorable.

Establishing Popular Support

Programs of curriculum dissemination must have the understanding and support of the many key persons involved. The gaining of these is a painstaking process which cannot be rushed. The events of this section illustrate these principles. They describe activities which occurred from October 1977 to September 1978.

Having received a favorable reaction from the state consultant, I telephoned my proposal to a number of the AEA consultants. Again, there was a positive response, pending examination of the materials. Soon 15 examination copies, and a cover letter, were in the mail to the AEA offices.

During the remainder of Autumn 1977, I prepared a proposal to the U.S. Office of Environmental Education. It employed the model being used at that very time with Project Learning Tree and the Energy Conservation Activity Packets, but with appropriate variations. Rather than 15 workshops there would be 8, since we would be drawing from a smaller population of teachers (mostly senior high, mostly social studies). With the exception of the state's largest, the AEA's would combine in pairs to offer "regional" workshops. These would be two days in length rather than one, to provide the minimal exposure which I felt these new and relatively complex materials demanded. Throughout the writing process, I was in frequent phone contact with Toomsen and selected AEA consultants, to sharpen, verify, or modify the plans as they were written.

In early December an abstract was sent to each AEA contact with whom I had been talking and corresponding for two months, to summarize all that we had been discussing, as it would appear in the proposal. It was accompanied by a request for a clear letter of commitment (not mere "support of the plan") to participate in the specific ways described in the abstract. The proposal as submitted in January 1978 included 13 such letters plus one from the State Department of Public Instruction. (The other two AEA's joined in but didn't get letters returned to me.)

During this proposal-preparation period, of course, similar cooperation and approvals had to be sought on my own campus. This was a sensitive process, for some very good reasons. The AEA's had begun giving their own credit offerings which, while not countable toward advanced degrees, were accepted for recertification by the State Department of Public Instruction. Thus I was proposing to cooperate with our competitors and their allies. But the relationships among the university, the department, and the AEA's are a wondrous mix of cooperative and competitive, positive and negative. Thus the proposal was not out of the question, but was certainly subjected to appropriate scrutiny at each administrative level prior to its January submission.

After January there was occasional telephone contact and correspondence among myself, the state consultant, and the AEA cooperators regarding possible minor modifications. The pace of these communications accelerated between July, when the award was granted, and September 11, the date of our first major planning meeting.

On September 11, the cooperators decided that five well-sited regional workshops, rather than eight, would give us better economies of money and effort, with two to four AEA's hosting each. They chose dates and sites, for February and March.

It can be seen that a number of steps were taken to establish and maintain popular support of the program. These included the September planning meeting itself, since the AEA consultants there made significant recommendations and decisions regarding the regional workshops to follow. Thus, by this time, they each had a personal stake in the program.

I made two requests at this meeting, which they honored. The first was that university credit be the only credit available for the workshops. The cooperators agreed not to offer competing re-certification credit; this did not close the door to their offering additional Audubon case study workshops of their own at a later time, for such credit.

The second request dealt with the number and nature of staff persons to be involved. The previous year's project had 15 area workshops, each staffed by the state consultant, the AEA environmental education specialist, and two area teachers. But in this new project several AEA's would join in offering one workshop, and classroom teachers had proved unable to serve as resource persons after the workshops. Were we to repeat the use of one AEA consultant and two teachers from each area, we would be overstaffed at the workshops and understaffed with persons who could act as resource persons thereafter. My suggestion, therefore, was that each AEA should involve two representatives--the environmental consultant and one other whose job would allow him or her to act as a resource person in a continuing capacity--possibly the AEA social studies consultant. Several reasons underlay this subject-area preference. The case studies are largely social studies in nature; many social studies teachers are expressing a need for good environmental materials in their area; the faulty stereotype of environmental education as being confined to the science curriculum continues to prevail and should be broken down.

It should be noted that these two requests and their rationale had previously been discussed with selected AEA consultants, and had been presented in earlier correspondence to all of them; the requests were not "dropped on them out of the blue." Again, this was consistent with our procedure for gaining popular support at each step of the program.

At this meeting, the AEA consultants suggested that the state consultant should be responsible for preparing and mailing promotional brochures, and that I should receive all applications directly, rather than through them, in order to better coordinate this work. They would promote the workshops in their own areas.

THE WORKSHOP PROGRAM

Thus, in the months following this meeting, the state consultant and I had certain objectives to achieve. His agency has a computerized address-label system with which he can mass-mail to any number of specified populations in Iowa: all elementary principals, all high school social studies departments, all who have attended environmental education workshops, etc. With this capability, and in his capacity as project Co-Director, he assumed complete responsibility for printing and mailing two different forms of promotional brochures with attached applications, one in November and another in January. In the meantime I accepted and acknowledged applications, reserved facilities, ironed out details of and won approval for the credit option at Iowa State, corresponded with applicants on "How to Get There and What to Bring," purchased the necessary films and other audiovisuals, identified an agency which would accept these on permanent loan from the university for free loan to teachers (the university could not provide this service to teachers), etc.

The Kickoff Workshop

At the kickoff workshop, February 4-6, 1979, 25 cooperators became rather immersed in the case studies and their rationale. Three beautiful films on Glen Canyon Dam, from opposing sides of the issue, were interspersed with small discussion groups and followed by some surprising revelations from the instructor about the films themselves and the court case that followed their production.

Each participant was next assigned to one of three groups opposed to certain stream channelization practices (farmers, state conservation agencies, citizen conservationists) or three supporting the channels (other farmers, channelizing contractors, U.S. Soil Conservation Service). They read background articles and presented testimony before a House Appropriations Subcommittee. Again, the instructor concluded with surprising information on the real-life chairman of that committee and the influence he has had on channelization and other environmental issues.

Participants then planned the future of the planet in light of certain unusual objectives.

They watched a young wildlife researcher engage in a genuine "Whodunnit" in the beautiful mountains of Idaho, and they learned what happened to him when he tried to act on his findings.

They brainstormed teaching ideas for a series of articles on environmental problems of agriculture, especially in Iowa, (The series won a Pulitzer Prize soon thereafter.)

They were briefly "talked through" the Instructor's Guide and Student Edition materials on other case studies.

With some minimal consultation from myself, they planned the agendas of the followup workshops and divided the teaching and logistical responsibilities among themselves, the state consultant, and myself.

By now, many readers will have noted that a number of techniques were used which contribute to the success of teacher-education workshops: the participants were actively involved in the learning process; a variety of teaching-learning strategies were employed; substantive content matter was included; the participants received all necessary instructional and background information materials so that they could replicate or adapt the experience with others.

The Regional Workshops

The cooperators apparently used very good intuition when they sited the five regionals, for the number of teachers at each ranged from 30 to 33. With one exception, a regional lasted from 1:30 PM on Sunday until 4:00 PM Monday, and included about 13 solid contact hours. The cooperators naturally applied their own professional judgment to the workshops and produced an interesting variety of techniques. In the Glen Canyon session at one workshop, one group saw a pro-dam film while the other saw the anti-dam film, before they were convened to a town meeting circa 1960, to discuss whether the dam should be built. The writer was placed in the fascinating position of being a pro-dam engineer acting as technical consultant to the meeting. (The planners knew that my predilection lay in another direction.) In four workshops the channelization simulation produced not only rapid learning about a topic previously unfamiliar to most participants, but heights of levity, drama, and thespianism as well. In the other workshop a debate on the nuclear power controversy replaced this simulation.

In all workshops, one of my roles was to provide the anecdotal background information which concluded most of the cases.

Anonymous statements gathered from the participants at all workshops were uniformly positive and in most cases enthusiastic. The statements for each workshop were typed and copies sent to the teaching staff of each.

Participants electing university credit attended additional sessions conducted by this writer five weeks after the workshops. They were required to introduce some of the cases into their teaching. They were to determine objectives, choose or create teaching strategies, conduct or direct the students in conducting research to broaden, deepen, or update the studies, and evaluate both student learning and the experience. By giving a credit incentive for this kind of work, we assured that the case studies were used in the classroom. Forty-seven of the 154 teachers took the credit option.

This project, as an adaptation of the previous year's model, is summarized by Figure 2.

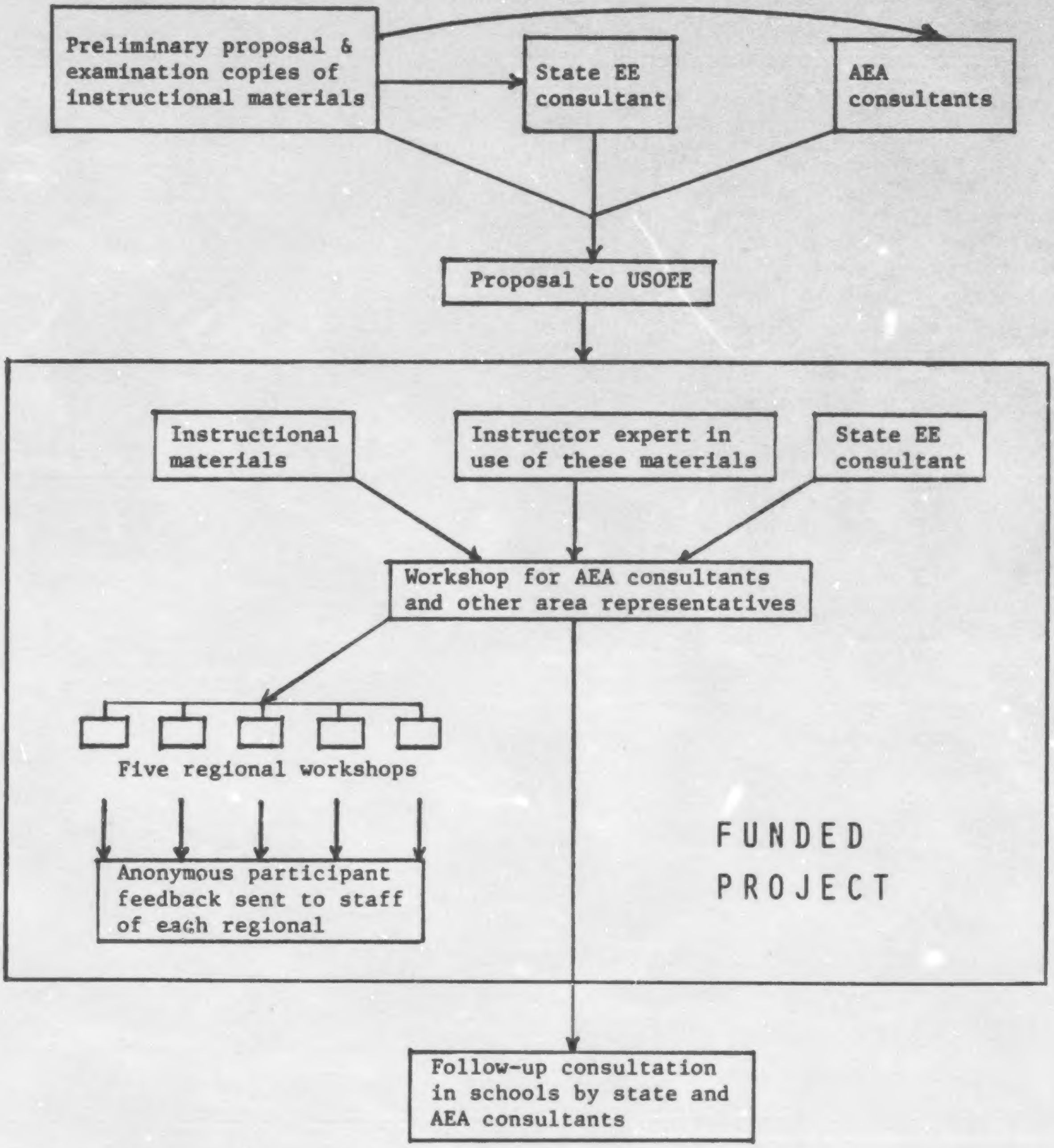
Preliminary proposal & examination copies of instructional materials
State EE consultant
AEA consultants
Proposal to USOEE
Instructional materials
Instructor expert in use of these materials
State EE consultant
Workshop for AEA consultants and other area representatives
Five regional workshops
Anonymous participant feedback sent to staff of each regional
FUNDED PROJECT
Follow-up consultation in schools by state and AEA consultants

Figure 2.--The Case Study Project

Summary

This paper illustrates a number of principles of successful curriculum dissemination.

We were fortunate to be in a state with an existing, simple, and efficient diffusion network, and to be sufficiently experienced to recognize it as such.

We began discussion with cooperators early, and gave them sufficient time to review the workshop materials.

All correspondence which included significant modification of plans was preceded by telephone consultation with a reasonable sample of cooperators, and incorporated their suggestions into the changes. (Indeed, their suggestions sometimes initiated the changes.) The correspondence always mentioned the telephone consultation, and invited the recipient to contact me if he/she disapproved or had questions.

The professional judgment of the cooperators was trusted, to good advantage. They planned effective agendas, and introduced some novel and successful teaching strategies not included in the cases as written. On the other hand, they used me appropriately as a resource person for information areas where my knowledge was clearly greater than theirs.

At the September 11 planning meeting I was ready with information on the restraints imposed by the grant and the possibilities it allowed us, and the major objectives to which it bound us; within that framework they made the decisions.

In both the kickoff workshop and the regional workshops, participants were actively engaged in small-group exchange and a variety of teaching-learning situations; they received substantive content information; they received all the materials necessary for them to replicate or adapt the experience in their own subsequent teaching.

University credit was awarded for classroom use of the materials, and not just for the workshop itself.

ASSEMBLING THE SOLAR NETWORK: AN ASSESSMENT OF SOLAR HEATING AND COOLING TECHNOLOGY IN SOUTH FLORIDA

Jerry B. Brown[1] and Greg Ballinger[2]

Abstract. *This paper reports on a survey of key people in the network through which solar heating and cooling technology is distributed in the subtropical climate of the Miami-Dade County area. Interviews were conducted with builder-developers, manufacturer-installers, bank loan officers, architect-engineers, educators, government officials, public utility representatives, and solar advocates. The survey indicates that environmental education must be conducted at all key leverage points in the network in order to successfully commercialize solar energy.*

Introduction

As national environmental awareness has grown, it has become apparent that those concerned with the environment must focus their attention not only on the preservation of wildlife and woodlands, but also on the activities of humankind. Humanity's behavior is rapidly bringing us to the limits of the biosphere's capacity to support human life (Mesarovic and Pestel, 1974). Thus, the study of human ecology must be included in a well-rounded environmental studies curriculum.

Among the various ecological pressures, accelerating energy consumption has become a major national and international policy issue. Due to the central role of energy in industrial society, there is a growing emphasis on energy education. The study of solar energy as a primary alternative power source should be an integral part of the energy section in an environmental studies curriculum.

This paper reports on and discusses a survey of individuals actively involved with solar energy and its applications. These individuals have important first-hand information about the economic, legal, and sociological status of solar energy. This information is essential for the design of effective energy education programs.

This study was conducted as part of a pilot research project to identify key leverage factors in the technology delivery system (TDS) through which solar heating and cooling (SHAC) technology is commercialized.

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It focuses on solar heating and cooling in the new and retrofit building market. The TDS concept proposed by Ezra (1975) represents the network infrastructure and multiple processes by which technological knowledge is applied to achieve desired socio-technical outputs.

A major goal of the study is to identify and examine key points in the TDS network such as builder-developers, manufacturer-installers, bankers, government officials, architect-engineers, educators, solar advocates, and utility representatives. By tracing the relationships between the various points of the TDS, we hope that incentives and obstacles to the processes by which SHAC is commercialized will be identified and set in an analytical context. Thus, this study will contribute both to the theoretical and case study literature on social factors in technological change and to the public policy discussion of solar energy.

This research has been sponsored by the National Solar Energy Research Institute in Golden, Colorado, and carried out under the direction of Dr. Luther P. Gerlach, Professor of Anthropology, University of Minnesota. It is based on field research in the metropolitan areas of Minneapolis, Minnesota; Miami-Dade County, Florida; and Denver, Colorado. The Florida case study was included because, while there is a good solar climate, preliminary research suggests that there is low solar energy utilization in this area. Thus, the Florida case may prove significant for understanding the underdevelopment of a solar TDS in some regions.

Methodology

Since there is little base-line research on the SHAC TDS in the Miami-Dade County area, specific questionnaire development is premature at present (see Butti and Perlin, 1978; Florida Solar Energy Center, 1978). For this reason, the data for this study were collected by means of relatively unstructured interviews and by unobtrusive procedures. The unobtrusive research procedures used include participant observation methods, the collection of literature and reports, and the collection of media artifacts (advertisements, clippings, and photographs).

In most interviews, the following topics concerning the SHAC TDS were addressed: products marketed; product reliability and maintenance; nature of the Dade County consumer and market; incentives and obstacles to commercialization; business and financial factors; scope of the TDS network; and future prospects of SHAC in Dade County.

A total of 68 interviews were carried out during Winter, 1979, in the Miami-Dade County area with the following groups: builder-developers (6), manufacturer-installers (19), bank loan officers (20), architect-engineers (6), educators (6), government officials (6) and others (5). The "other" category includes a solar information referral service, an anti-nuclear organizer, two power company officials, and a solar advocate.

In order to identify builder-developers utilizing solar water heaters in their projects, all 78 home builder companies listed in the 1978-79

Greater Miami Telephone Directory were called. Of those called, seven were using solar water heaters (with four using it only at the customer's request); 39 did not use it; and the remaining 30 either could not be reached or were no longer in business. Manufacturer-installers were also identified from telephone directory lists and from data published by the Florida Solar Energy Center (FSEC, 1978). Similarly, a random sample of bank loan officers was selected from the telephone listing of Dade County banks.

Many interviews produced additional names of people or groups that make up the SHAC TDS network in Dade County and throughout Florida. Most of the key names were incorporated into the interview schedule. However, due to time limitations, not all of these leads could be followed up and they remain a ripe area for future investigation.

Of the 68 interviews, 31 were conducted in person during office visits and 37 were done by telephone. Dr. Jerry Brown completed 45 interviews; the other 23 were done by Mr. Greg Ballinger.

The unstructured interview technique proved to be well suited for this preliminary study, especially since most respondents' viewpoints corresponded to their role in the TDS. The unstructured interview technique allowed each respondent to elaborate at length on his perception of the situation.

In general, most people contacted for interviews were very cooperative. With the exception of several builders who were too busy for even a 20-minute telephone interview, many respondents appreciated the opportunity to express their views on solar heating and cooling in Dade County. However, in evaluating this report, one should keep in mind that many of the respondents are directly involved in either selling or advocating the rapid commercialization of SHAC technology.

Summary of the Data

In general, respondents' viewpoints seem to be determined by their position in the solar network. Thus, the following data summary is organized according to the different groups of people interviewed. Only the data highlights are presented here.

1) Builder-Developers expressed the following opinions:

   a. The front-end costs of solar water heating, as compared to the alternatives of gas and electricity, are too high.

   b. If the consumer really wants solar technology, then builders would simply provide it as an additional housing option. At present, there is little consumer demand for solar water heaters; one builder reported no response, and another a 10 percent response, to the solar water heating option they offered on model homes.

   c. SHAC technology should not be imposed through legislation, but should be encouraged through financial incentives. There is already too much poorly designed governmental energy legislation, such as the State of Florida Model Energy Efficiency Building Code (1978), which limits the construction of energy efficient homes suitable to the unique climate of South Florida.

2) Manufacturer-installers appeared to have the most practical and extensive knowledge of the SHAC TDS, due to their special role as entrepreneurs. They held the following opinions:

   a. The creation of a "solar installer" license at the county level to replace the cumbersome and expensive licensing regulation presently in effect is a top priority for the industry.

   b. Education of consumers and public officials as to the economic benefits and reliability of solar water heating technology is essential. In contrast to its present "do-nothing" attitude, Florida government should make a policy commitment to solar and take the lead in this educational process.

   c. Florida Power and Light Company's television advertisements which misrepresent solar energy are misleading the public and directly hurting the solar industry.

3) Bank Loan Officers held the following views:

   a. Depending on the credit rating of the customer, most bankers would make a loan to finance solar water heating installation for both new and retrofit home construction. However, several loan officers stressed that there was very little interest in such loans and that they would not extend them for solar pool heaters.

   b. At present, there are no bank fiscal policies that encourage the use of solar energy or energy conservation in building construction. Nor are there any programs in effect to make loan officers more knowledgeable about solar technology.

   c. A majority of the loan officers interviewed personally believed that solar energy was an excellent idea that should be encouraged; several loan officers had no opinion on the topic.

4) Architect-engineers and educators expressed similar views, which are summarized as follows:

   a. South Florida is located beneath the frostline in a subtropical climatic zone that is unique in the continental United States. Unfortunately, South Florida building standards are all too often determined by nationally recognized energy codes, such as American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 90-75, which are designed for climates where heating is more important than cooling. The reverse is true in Dade County.

b. Proper passive architectural design and insulation could meet most of the heating and cooling needs in Dade County buildings without utilizing mechanical technologies. Many local architects are familiar with traditional building techniques suitable for the tropics, but government energy bureaucracies are staffed mainly by engineers who think primarily in terms of mechanical solutions.

c. A top priority must be placed on energy education for all sectors of society, and particularly for builders, architects, engineers, bankers, government officials and consumers.

5) Governmental officials expressed the following:

a. The Florida Statutes have established legal parameters for solar energy in four areas: standardization, solar access rights, energy analysis of new state construction, and property assessment. However, with the exception of standards and testing (Solar Energy Standards Act of 1976, Florida Statutes, Chapter 377.705) which are administered by the FSEC, there seems to be little public awareness and slow official implementation of this legislation.

b. Neither Dade County nor Broward County Energy Offices have established aggressive programs for the commercialization of solar energy. The Metro Dade County Energy Coordinator does not believe that government should be a leader or innovator in this area.

c. All officials agreed that more public education and solar energy demonstration projects were necessary.

Summary and Conclusion

As Starr (1979) points out, Florida seems to be well-suited for rapid commercialization of domestic solar water heater technology. Nevertheless, this survey of the Miami-Dade County area suggests that the commercialization of SHAC is progressing slowly even in the post-1973 context of rising oil costs.

The data indicate that there is no integrated technology delivery system or solar network in operation at present. Rather, there is a loose confederation of groups and individuals who share a concern with solar energy, but whose economic, political, and functional interests diverge dramatically. Furthermore, within this "network," no key leverage point has emerged to mobilize the other actors into effective or unified action.

The above data indicate that education is a major concern of all those interviewed. They felt the need for more information for themselves, for key groups, or for the public in general. Department of Energy Secretary Schlesinger's February 1979 memo to the President endorsing the potential of solar energy is indicative of a growing governmental commitment to the large-scale use of solar technologies. This commitment will create a demand for effective educational programs to disseminate information on energy as a whole, and on solar energy in particular.

The results of this survey suggest that the most effective approach will be a multitargeted, multidisciplined, locally-oriented series of programs.

"Multitargeted" refers to the need to educate the key groups identified above, as well as the general public. Although the public must be informed as to the promise and limits of solar energy, this will have little effect if those groups responsible for its implementation do not have the detailed technical knowledge they need. Each of these groups (builders, architects, legislators, bankers, bureaucrats and educators) have different and specific informational needs ranging from engineering details to sociological analyses.

A multidisciplinary approach is required to integrate the diverse information needed to make wise choices about energy usage. A frequently cited reason for the slow growth of solar is the lack of economic understanding among consumers. Many respondents felt that issues such as pay back, rate of return, and lifecycle costing are not understood by the public, and that this confusion causes them to ignore solar. In addition to utilizing concepts from fields such as economics, physics, and ecology, it is also necessary to distinguish among the various solar technologies. As pointed out above, passive solar technologies are often overlooked in spite of their great potential.

Interregional differences such as climate, ground water temperature and materials endurance preclude the development of a single national solar curriculum. These differences, as well as different political, economic and sociological conditions, require the development of programs tailored to their region. In Dade County, Florida, for example, significant institutional barriers (complexity and expense of obtaining installation permits) exist, while the subtropical climate greatly simplifies the technical aspects (Starr, 1979).

The priority given to educating the various target groups varied considerably between the respondents, yet all were in agreement as to the need to educate the general public. Most felt that significant change will not occur until the public reaches an understanding of the energy situation as a whole, as well as of solar energy in particular. This implies the need to develop educational materials and teacher education programs to introduce these topics into primary, secondary, and postsecondary education. A media approach is also necessary in order to reach those outside the formal educational system, to clarify the

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government's presently confusing policies, and to counteract the perceived anti-solar bias of power corporation advertising. There is a strong feeling that the establishment of demonstration projects will speed the acceptance of solar energy by providing visible evidence of its feasibility.

Since most of the target groups contain individuals already quite busy with their own activities, any educational program directed toward these individuals must take this into account. Possible approaches for these groups include: day-long conferences, weekend workshops, one-week mini-courses, TV classes, and continuing education programs.

This multifaceted approach has organizational implications of its own. It is unlikely that any one institution could offer the wide variety of programs necessary for an effective impact in any local energy situation. There already exists in any community a number of institutions through which these programs may be offered. For example, teacher training programs are already in place in many universities, while vocational skills (solar equipment installation) may easily fit into existing adult education programs. In Dade County alone, the following organizations and institutions have the potential to be involved in energy education: The Florida Solar Energy Center, the Regional Energy Action Committee, South Florida Regional Planning Council, Dade County Energy Office, Dade County Public Schools, local colleges and universities, the Museum of Science, the Builders Association of South Florida, the South Florida Chapter of the American Institute of Architects, public radio and TV, the Florida Solar Users Network, conservation organizations, and the solar industry.

It is evident that there is a need to coordinate the activities of these diverse groups to promote effectiveness and to reduce duplication and confusion. It is suggested that the establishment of a "solar network" would make a major contribution to the development and commercialization of solar technology both in South Florida and in other areas of the country with high solar potential. Major functions of the network would include the planning and coordination of educational programs, research strategies, and public policy options related to solar energy. The establishment of this solar network would be the first step toward developing a comprehensive solar energy education program in South Florida.

Within Dade County, Florida, those involved with solar energy and its applications point out three main areas of concern. These are education, economics, and government regulation. The most significant area is education. An analysis of the survey indicates that the most effective approach to energy education will be through a multitargeted, multidisciplinary, locally-oriented series of programs addressing the general public as well as several key professional groups. Due to the large number and diverse characteristics of those people potentially involved in this approach, a solar network should be established to promote activities, to facilitate communication, and to coordinate programs.

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INDIA: AID TO VANISHING WILDLIFE

Carol A. Lively[1]

Abstract. *The U.S. Fish and Wildlife Service, under Section 8A of the Endangered Species Act of 1973, uses excess foreign currencies (PL-480) for conservation of endangered wildlife in India. Financial support and technical assistance from the Fish and Wildlife Service aid in expanding Indian conservation efforts to protect wildlife habitat, manage endangered wildlife species, provide professional training in forestry and wildlife management, and further environmental education programs. Through such cooperative efforts, Indian public awareness of environmental problems will lead to increased programs of resource management. Programs of this type will, in their turn, enhance habitat preservation and ensure India's wildlife a chance for survival.*

"You can build another Taj Mahal, but if the Thamin deer vanishes, nothing can bring it back." (Pushpa Kumar, Director, Hydrabad Zoo, Andhra Pradesh, India.)

A Chance for Conservation

Orthodox Hindus believe that man cannot exist without being in harmony with the surrounding world. This belief, however, is eroding as India strives to meet growing requirements for agricultural and industrial development. The demands of human population, which is expected to grow from 600 million to 1 billion by the year 2000, are causing serious losses to India's rich natural environment (Agarwal 1978).

India's wildlife is slowly being squeezed into remaining patches of forest, areas which in all likelihood are too small to meet the large territorial requirements for species such as the elephant (Elephas maximus) and tiger (Panthera tigris). Ungulates such as deer and the guar (Bos gaurus) are forced to compete with domestic cattle for food, and at the same time are subject to domestic cattle diseases such as rinderpest.

The Government of India, however, recognizes that a valuable resource is disappearing. In 1952, major efforts for the protection of wildlife began with the creation of the Indian Board for Wildlife. Through the Board's efforts, former royal game preserves and game sanctuaries of British India were reorganized as wildlife sanctuaries and national parks. State Advisory Boards were set up and legislation concerning sanctuaries and parks was enacted by the states.

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In 1969, the International Union for Conservation of Nature and Natural Resources held its 10th General Assembly and 11th Technical Meeting in New Delhi. The presence of 300 conservationists from throughout the world was a stimulus for Indian conservationists to protect remaining natural areas and bring about increased public awareness of the value of wildlife.

In 1970, India prohibited all shooting of tigers and ordered a census of their population. The Government initiated "Project Tiger," a program which created nine tiger reserves, including the best remaining tiger habitat in the country (Futehally 1977). The Wildlife Protection Act of 1972 banned the killing of 61 endangered species, provided stiff penalties for offenders, and laid the legal framework for enforcement. Most state governments have reinforced the Wildlife Protection Act by passing similar state laws.

"Fortunately our government has decided that India will be much poorer both spiritually and materially if its wildlife is allowed to collapse," said Zafar Futehally, vice-president of World Wildlife Fund-India. "The Indian Board for Wildlife, the National Committee on Environmental Planning and Coordination, and the Steering Committee for Project Tiger are all trying to ensure that the interests of wildlife are not disregarded in India's development plans" (Futehally 1977).

Indian officials feel that the key to preserving wildlife lies in the education of children. Many state governments are planning to introduce environmental education into school curriculums, and private organizations such as the World Wildlife Fund-India are making parallel efforts. The Education Project of World Wildlife Fund-India is one of the largest on-going environmental education projects undertaken in the country. Its primary focus is school-aged children, and it is attempting to develop a corps of interested youths, teachers, and adult volunteers who will spread environmental awareness (Variava 1978).

A Tool for Promoting Conservation

The United States has accumulated holdings of Indian currencies or credits under the Agricultural Trade Development and Assistance Act of 1954 (Public Law 83-480). A portion of these holdings may be declared excess by the U.S. Treasury whenever the amount held is sufficient to meet all U.S. Government requirements for two years. These excess currencies then may be applied to optional assistance programs (1978).

Section 8A of the Endangered Species Act of 1973, as amended, authorizes the U.S. Fish and Wildlife Service to use excess currencies to promote the conservation of endangered species through financial support and technical assistance in the following areas:

1. Analysis and protection of wildlife habitat;
2. Creation of parks and sanctuaries;
3. Management of endangered species;

4. Professional training in forestry and wildlife management; and
5. Environmental education.

Countries participating in the excess foreign currency program determine their own projects and priorities for funding. The U.S. Fish and Wildlife Service acts as an advisor, monitors the projects, and assists in project modification where necessary.

The Indian Government quickly recognized the potential for increased conservation action through PL-480. They invited the U.S. Fish and Wildlife Service and the National Park Service to send study teams to India in January and February of 1978 to explore possible applications of the PL-480 program.

To date, twelve conservation projects have been negotiated by the U.S. Fish and Wildlife Service and the Government of India. Of these projects, six have completed full Indian review and clearance, and six are in various stages of review. Projects approved by the Government of India, for which contracts will soon be written, include a national survey of endangered and threatened plants, enhancement of the Visak Marine Park, captive breeding of endangered species such as the mugger crocodile (*Crocodylus palustris palustris*) and swamp deer (*Cervus duvauceli*), a zoological exchange in cooperation with the Smithsonian Institution, enhancement of Keoladeo Ghana Bird Sanctuary, and research on the avifauna of India.

Three additional projects in the final stages of review address an endangered species survey of India, breeding of various endangered deer and antelope at Lucknow Nature Reserve, and development of Borivli National Park near Bombay. These nine projects will obligate an estimated $547,068 out of the total authorizations of $746,200 granted to the U.S. Fish and Wildlife Service for India in Fiscal Years 1977-79.

Potential for an Expanded Indian Conservation Program

In November and December of 1978, as part of the U.S. Fish and Wildlife Service participation in the PL-480 program, a team composed of Dr. Robert S. Cook, Deputy Director, U.S. Fish and Wildlife Service; Howard Brokaw, President, Delaware Nature Education Society; and the author was invited to India to evaluate and make recommendations on a World Wildlife Fund-India proposal for a comprehensive environmental education program. The purpose of the program is to "accelerate the growth of awareness and concern for nature and wildlife conservation through a rapidly broadening programme of education throughout the country."

The proposal recommends the creation of an environmentally educated core of citizens in the general public, rural groups, youth groups, and in governmental and non-governmental institutions. These core individuals would act as catalysts for promoting awareness, concern, and action in the environmental field. This program will lay the foundations for a government sponsored framework that will encourage public participation in environmental awareness programs throughout the country.

Recommendations made in the proposal included creation of a task force to examine additional strategies of developing a comprehensive environmental awareness program. A second responsibility of the task force would be to review existing programs, resources and regional requirements, and refine an action plan. The proposal is presently being redrafted by a member of the Executive Board of the World Wildlife Fund-India, Duleep Mathai, and is expected to be submitted to the Government of India for review within the next few months. If approved, it will be one of the major PL-480 projects in India and World Wildlife Fund-India would be the recipient of PL-480 funding to implement the program.

Professional Education--Stepping Stone to Public Awareness

Secondary objectives of the trip were to visit several wildlife sanctuaries as background for the World Wildlife Fund-India proposal and to evaluate these areas as potential sites for additional PL-480 projects, particularly in the areas of environmental education.

India has more than 150 sanctuaries covering approximately 0.5 percent of the land area. Several more are being contemplated (Futehally 1977). Hunting and trapping are prohibited except under circumstances permitted by the sanctuary manager. In most cases, sanctuaries are open to visitors.

The administration of wildlife sanctuaries is the direct responsibility of the State Governments, and regulations regarding sanctuary management are enforced through State Forest Departments. Although essentially created for wildlife, sanctuaries continue to be utilized for silviculture, and they follow policies dominated by political considerations and revenue-producing requirements (Roy 1978). Programs in wildlife research, wildlife management, and education are generally the work of interested staff persons who have little time or money to devote to these projects. However, managers have consistently expressed their interest in wildlife and the need for training relating to wildlife and environmental communications.

Wildlife management curricula could be developed in India's Forestry Officer Training School at Dehra Dun and at other universities to provide the training necessary to broaden the perspectives of the sanctuary staffs. Their primary interests would continue to be in silviculture, but they would understand the need to maintain habitat for wildlife.

Additional training is needed in environmental communications and public relations. "The Forest Department must learn to communicate with the people, so they begin to understand how and why (conservation) activity is in their interest and that of the country," said S. K. Roy, a former Director General of Tourism (India) (Roy 1978).

Education of potential sanctuary personnel in wildlife management and environmental communications programs ultimately will increase public awareness and accelerate protective action on behalf of India's wildlife. PL-480 has great potential for increasing such programs by providing funding for the development of training centers and establishing visiting professor positions at universities such as at Dehra Dun.

The Role of Sanctuaries in Increasing Environmental Awareness

There is an urgent need in India to relate sanctuary management to the needs and attitudes of local people (Roy 1978). Environmental awareness programs funded through PL-480 and developed with U.S. Fish and Wildlife Service technical assistance could be used to inform local people of the effects that grazing, poaching, and deforestation have on wildlife and wildlife habitat. Hopefully, education would decrease these activities on sanctuaries. In the same manner, environmental awareness programs could demonstrate the values of wildlife which can be harvested to provide food or cash crops or can attract tourist revenue.

With increased training, sanctuary personnel could more easily work with local villagers to arrive at mutually agreeable solutions to common resource problems. Many sanctuary-village conflicts could be alleviated by cooperative programs such as rotational grazing, reforestation, revenue sharing, and payment for damage caused by wildlife to village crops and livestock. One sanctuary official felt that education of the local villagers could do more to protect the sanctuary than any other effort.

Wildlife sanctuaries also have an excellent opportunity to provide environmental information to visitors. Many sanctuaries receive heavy use by school groups, adults, and foreign tourists, but little information is provided to visitors at this time. If funding and trained personnel were available, it would not be difficult to provide environmental messages linking wildlife to habitat. There are many opportunities in sanctuaries for talks and demonstrations, guided tours, interpretive signs, and brochures. Some of these methods are now being employed, but they generally need upgrading in both content and presentation.

Low-cost written information will be difficult to provide in India, which has 14 recognized languages and over 350 dialects. A possible solution is the use of multi-lingual sanctuary personnel for live talks and demonstrations. Most educated Indians speak three or more languages (Hindi, English, and a regional language), and finding multilingual personnel on sanctuary staffs is not a problem. Another possible alternative is the use of multi-lingual slide-tape message repeaters.

Alternative Facilities for Increasing Environmental Awareness

Zoos are underutilized as a medium for dissemination of environmental information. Zoos are a low-cost recreational resource for a large portion of the general Indian public and millions of Indians visit zoos each year. On a Sunday afternoon in December, the team shared the unfinished zoo at Visak with 15,000 Indians.

The team discussed various means of providing information to visitors including the use of interpretive signs, leaflets, and a volunteer guide service of trained high school students. PL-480 can provide funding for environmental communications as well as for captive breeding of endangered species and general zoological park enhancement.

Excellent opportunities also exist under PL-480 for the creation of Nature Centers which would offer hands-on environmental learning activities at the primary and secondary school levels. Nature clubs administered by the World Wildlife Fund-India have initiated many hands-on environmental activities and are very popular in the Bombay area. A student participant in one of the World Wildlife Fund-India nature club training camps expressed this feeling:

> It was education as it ought to be, not something in print or remote, but something which made a deep impression on the mind because we felt ourselves overwhelmed by the subject under study. Nature was all around us and literally at our fingertips to touch and feel (Fernandes 1978).

These are but a few possibilities for increased environmental awareness programs in India. Others include expanded use of environmentally-oriented radio programs and films, and environmental awareness training of primary and secondary school teachers through the Ministry of Education.

Under the PL-480 program, environmental awareness is a key element in helping conserve endangered species and protecting wildlife habitat. Shared Indian-U.S. knowledge in these areas will be ultimately beneficial to the resource.

Conclusion

Because of radically different cultures, values, education, and basic pressures of living created by increased human population growth, environmental awareness programs in India cannot be totally modeled after programs now existing in the United States. Environmental awareness programs must focus on Indian problems and provide Indian solutions.

In the last 30 years, the Indian Government has shown a great deal of concern for disappearing wildlife and wildlife habitat. Present actions to change the situation include creation of new sanctuaries, consideration of wildlife management training programs in universities, and expansion of education programs to increase public awareness of environmental problems.

PL-480 funding and technical assistance from the U.S. Fish and Wildlife Service will aid in expanding Indian conservation efforts and in finding solutions to conflicts between development and conservation. It is perhaps optimistic to predict that Indian wildlife will flourish, but the chances for survival of Indian wildlife are certainly improving.

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EMPLOYMENT TRENDS FOR A MICHIGAN ENVIRONMENTAL EDUCATION MAJOR

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Abstract. *The 1973-78 placement data for Environmental Education majors at Michigan State University were examined. It was found that most Environmental Education majors were science teachers. The 13 percent average unemployment was similar to other teaching majors; underemployment was high and increasing. Environmental Education students should combine their major with a high-demand traditional subject. Institutional programs should facilitate this combination.*

Michigan State University has conducted its own test case on the training of environmental educators. In 1972, the University established an environmental education major and minor within the College of Agriculture and Natural Resources. One year later, the State Board of Education for Michigan approved environmental education as a certifiable teaching major and minor for the state. The program entitled Natural Resources and Environmental Education is a general natural resources curriculum which provides students with a course selection from the four Natural Resources Departments and also requires exposure to a variety of interdisciplinary environmental courses. The major is offered as an option within the Departments of Fisheries and Wildlife, Forestry, Parks and Recreation, and Resource Development. Administration was assigned to a four-person committee representing each of the four participating departments. From that committee, a coordinator was selected. The majority of the administration, organization, and advising is carried by the coordinator. During the five years discussed in this paper, the major has declined from a peak of 180 students (1975-76) to about 103 students at present. For several years, the major was the third largest teaching major within the University.

This background is important because environmental education is a unique teaching major and minor is antagonistic to the interdisciplinary, integrated approach that we as environmental educators hold. This major was designed to produce subject matter generalists in natural resources with an environmental emphasis who could teach ecology, environmental science, environmental studies, or education at the secondary level. General university requirements, a 12 quarter-hour interdisciplinary block, and a required teaching minor are the primary connections with interdisciplinary and multidisciplinary goals.

Whether or not that approach has been successful is the question addressed by this paper. Criteria for success may be many, but the two most commonly discussed are 1) some subjective measure of the quality of the graduates, and/or 2) the employability of the graduates.

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Research for this paper was stimulated by our need to know if we have been successful. We need to know the following: 1) whether our students are obtaining jobs in environmental education; 2) where they are obtaining jobs in schools; 3) whether teaching certification improves job success; and 4) whether they are underemployed.

Methodology

The data utilized in this report were obtained from the Michigan State University Placement Services Reports. Included were the reports from the years that Natural Resources and Environmental Education has had graduating students (1974-78). The procedure used by the MSU Placement Services in collecting the data is explained in the 1977-78 report:

> The 1977-78 Follow-Up Report of Placement Services includes information on 6,633 of last year's 10,242 graduating students. Each college and major offered at Michigan State is listed in this report. All students who graduated are listed whether or not we had information concerning their career plans. Graduates who reported employment are listed with the name of their employer, city and state, and job title. Students who notified us that they were unemployed are listed as such. A blank follows names of students who did not respond to our surveys. All August and December graduates of 1977 and March and June graduates of 1978 at all degree levels are listed.
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> Data from this report is [sic] collected from questionnaires sent to all graduating students each term. The questionnaires are sent two weeks before graduation and twice during the three months after graduation. If a candidate answers one survey, they are [sic] eliminated from succeeding survey mailings unless they are unemployed, and then they are [sic] surveyed again. Data is [sic] also collected from employers who hire Michigan State graduates and from Michigan State faculty who know the career plans of their graduating students. Graduating students also sometimes report directly to Placement Services when they are hired by an employer or decide their career plans. From all these sources, the final Follow-Up Report is prepared.
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> Career distribution and geographic distribution summaries of graduates by degree level and totals appear after each college listing. Graduates who were jointly prepared by the College of Education and another college are listed in their appropriate college (Shingleton and Scheetz 1978).

Please note that data are predominantly gathered during the three months following graduation. In the years following, the employment situation may change dramatically but those data are not currently available.

Totals, subtotals and percentages have been used primarily to address the questions raised.

Results and Discussion

How Many Students Have Graduated from the Program, and What Proportion of Those Have Obtained Teaching Certification?

TABLE 1

Number of Students Graduating from Natural Resources and Environmental Education and Their Response to Job Placement Surveys

Year of Gradu-ation	Number of Graduates	Number Not Reporting	Number Obtaining Teaching Certification	Number in Non-school Employment
73-74	11	4 (36%)	7 (63%)	3 (27%)
74-75	38	10 (26%)	21 (55%)	13 (34%)
75-76	50	12 (24%)	25 (50%)	23 (46%)
76-77	50	13 (26%)	35 (70%)	22 (44%)
77-78	46	10 (22%)	26 (56%)	23 (50%)
Totals	195	49 (25%)	114 (50%)	84 (43%)

During the five years of data reviewed in this paper, the total number of students that have graduated from our program is 195 (Table 1). That number seems comparatively small considering the 44,000 student body of Michigan State University. It is only one-half the size of the smallest Natural Resources Department, Parks and Recreation Resources. Yet, this is a program which received no additional resources, which was initiated with the addition of only one course, and which has no budget or staff of its own. The number of on-line students is currently on a strong downward trend. Peak loading of on-line students was about 180 during the 1976-77 school year. The current number of enrolled students is about 103, with 75 percent in their junior and senior years. That concentration in the last two years could suggest a drastic enrollment drop, but traditionally we have had a large input of transfer students which creates a disproportionally large junior-senior class.

Of the 195 graduates, 114 (58 percent) have obtained teaching certification. The intent of the development committee was to train educators and/or communicators for both formal education (credit) and non-formal educational settings (non-credit, recreational or interpretational). Because the non-teaching option was viewed as competitive with other non-teaching majors within Natural Resources, particularly Parks and Recreation Resource Interpretive Option Majors, the non-teaching option was eliminated as an advising option (i.e., the option was still listed in the catalogue, but students were strongly advised against taking it because the job opportunities were fewer). As a result, the 56 percent obtaining teaching certification for 1977-78 is very surprising. In subsequent years, however, this figure should approach 100 percent. The decision to eliminate the non-teaching option is unwarranted based on the 43 percent average obtaining employment in non-school situations. However, the teaching, communication, and planning skills developed in a pre-service education curriculum are applicable to a variety of other employment opportunities other than formal education. This argument warrants maintaining the "teaching-certification-only" route.

During the growth years of Natural Resources and Environmental Education, its quantitative position among teaching majors at Michigan State changed dramatically. The first graduating class ranked 27. In subsequent years, the ranking climbed to 12th, and in 1976 was in the top seven for all teaching certification majors and in the top four of secondary teaching majors. Both the growth of Natural Resources and Environmental Education as a major and the decline of other majors contributed to the relative change in ranking. Despite recent enrollment declines, Natural Resources and Environmental Education still remains ranked in the top six of secondary teaching majors at M.S.U.

Earth Day was probably the most important contributor to the rapid growth of Natural Resources and Environmental Education five years later. But there were also more subtle reasons for that growth. Natural Resources and Environmental Education was a major perfectly suited for the female with natural resources, outdoor or interpretive interests in that acceptance in the job market was not a problem. The other natural resources fields have been male-dominated, but that situation is rapidly shifting. While the other Natural Resource Departments have had large increases in female students during the last five years, Natural Resources and Environmental Education has maintained a relatively constant 1-1 female-male ratio. Another significant but not obvious reason for the growth of Natural Resources and Environmental Education was the lack of a chemistry requirement. By completing a three-course natural science sequence, Natural Resources and Environmental Education students could fulfill both major and college requirements. Since Natural Resources and Environmental Education was the only major within Natural Resources not requiring chemistry, it was the only choice for those having difficulty with that subject. Lastly, many students hoped that schools would initiate new programs and hire new teachers to meet those program needs. Some programs did develop, but rather than hire new teachers, traditional subject teachers requested placement in these programs. In addition, lack of tax support, declining enrollments, and the back-to-the-basics movement negated much of the new program development. The result was a teaching major with a large enrollment but with few employment opportunities.

How Does Employment of Natural Resources and Environmental Education Compare with Other Teaching Majors within Michigan?

Thirty-six (18 percent) Natural Resources and Environmental Education graduates were employed by schools. Of that number, three were employed as substitute teachers and one as a teacher's aid, so the corrected percentage for full-time employment is 16 percent. This part-time employment is not an unknown strategy for obtaining more permanent employment.

Personal discussions indicate that the unemployed are still pursuing full-time employment with this strategy. The peak placement was 1974-75 graduating class. Over the other four years, placement has been rather constant. The significance of these figures is best seen when compared with other teaching majors.

When comparing the teaching majors of Table 2, the 18 percent placement is low. The other lowest average percent employment was Social Science. That major exhibited an increase to 50 percent or more school employment during the 76-78 school years. But during that same time period, the number of graduates dropped by 50 percent also. That same decrease is evident in Natural Science Education graduates and Total Teacher Education graduates. Only Agricultural Education has remained relatively constant.

TABLE 2

The Number of Students Employed in Schools Per Year in Selected Education Majors and the Total of All Teaching Majors

Year	Natural Resources and Environmental Education	Natural Science Education	Social Science Education	Agriculture and Natural Resources Education	Total of Teacher Education
73-74	$\frac{2}{11}$ (18%)	$\frac{46}{103}$ (34%)	$\frac{27}{68}$ (39%)	$\frac{7}{9}$ (64%)	$\frac{686}{1256}$ (55%)
74-75	$\frac{11}{38}$ (29%)	$\frac{36}{63}$ (57%)	$\frac{11}{34}$ (32%)	$\frac{12}{14}$ (86%)	$\frac{445}{913}$ (49%)
75-76	$\frac{7}{50}$ (14%)	$\frac{29}{62}$ (47%)	$\frac{8}{26}$ (31%)	$\frac{5}{12}$ (42%)	$\frac{557}{961}$ (58%)
76-77	$\frac{9}{50}$ (18%)	$\frac{31}{51}$ (61%)	$\frac{7}{14}$ (50%)	$\frac{7}{9}$ (78%)	$\frac{473}{761}$ (62%)
77-78	$\frac{7}{46}$ (15%)	$\frac{35}{60}$ (57%)	$\frac{5}{9}$ (56%)	$\frac{8}{15}$ (39%)	$\frac{435}{668}$ (65%)
Total	$\frac{36}{195}$ (18%)	$\frac{177}{339}$ (52%)	$\frac{58}{151}$ (38%)	$\frac{39}{59}$ (66%)	$\frac{2596}{4559}$ (57%)

Smith (1977) concluded that 30 percent of certified graduates intentionally do not enter the teaching job market. Based on this information, we can account for 96 percent of the Agricultural Education graduates, 82 percent of the Natural Science graduates, and 87 percent of all Teaching Education graduates. The 48 percent total for Natural Resources and Environmental Education does not compare well on this basis with more than 52 percent wishing to obtain teaching positions but unable to do so, while the other compared majors are in the 32 percent to 4 percent range.

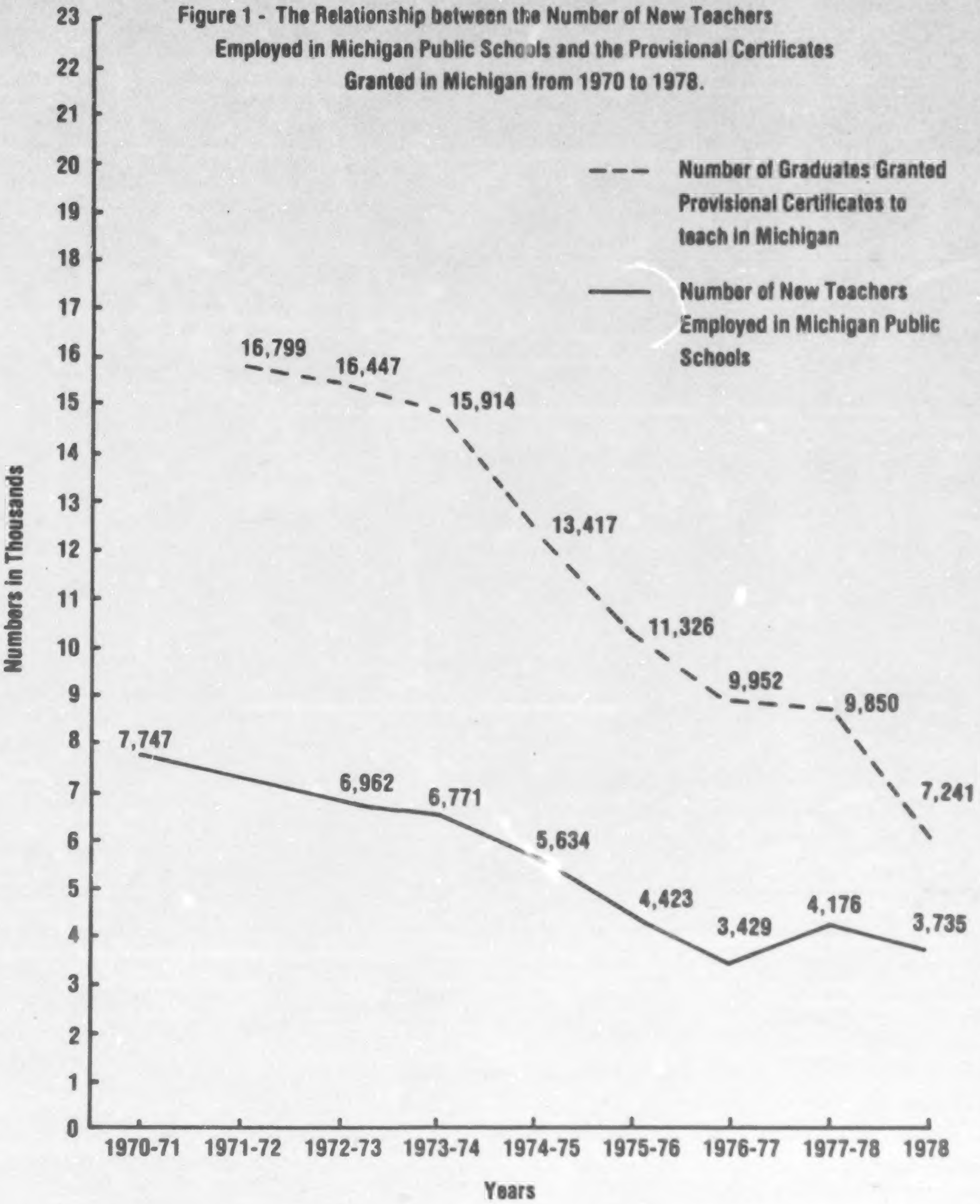
Agriculture and Natural Resources Education is interesting because it is the other teaching major within our collete. They also have a most unique employment situation of having more positions than graduates to fill those positions, yet their placement remains at 66 percent. Private industry is an attractive alternative to their graduates as are informal education settings such as the Cooperative Extension and 4-H. Why not combine these as a major and minor? Students have been advised in that direction, but this encouragement has not had a drastic impact for several reasons. One reason being that to teach vocational agriculture, two years of vocational experience is required; experience which our students don't have and generally seem reticent to obtain.

General Employment Trends for Teachers

To more completely understand Natural Resources and Environmental Education's relationship to pre-service teacher demand and production, an examination of new teacher employment and new teacher production is important. In our state, like many others, the Michigan Education Association and the American Federation of Teachers have a constant critical chorus against teacher training institutions, especially concerning trends in future teacher employment when colleges and universities are trying desperately to maintain inflated schools of education. On the other hand, professional organizations or unions are defending their in-service territory to protect their current members.

Examination of Figure 1 suggests why colleges of education are having difficulties. Over eight years, the number of Provisional Certificates granted has dropped by more than one-half. Employment in Michigan Public Schools has also dropped by more than 50 percent, but the difference between graduates available with certificates and new teacher employment is now only 3,506 surplus graduates rather than 9,051 surplus graduates. Therefore, the opportunities of obtaining a teaching position are better now than they have been for some time. But before we become too elated, we must remember that we over-produced by over 54,000 teachers during that same period, which remains a tremendous residual force to hire from, if that residual group is still interested in teaching.

Figure 1 - The Relationship between the Number of New Teachers Employed in Michigan Public Schools and the Provisional Certificates Granted in Michigan from 1970 to 1978.



Source: Scheetz, 1979

Figure 2 – Classroom teachers in elementary and secondary day schools, with alternative projections: United States, fall 1956 to 1986

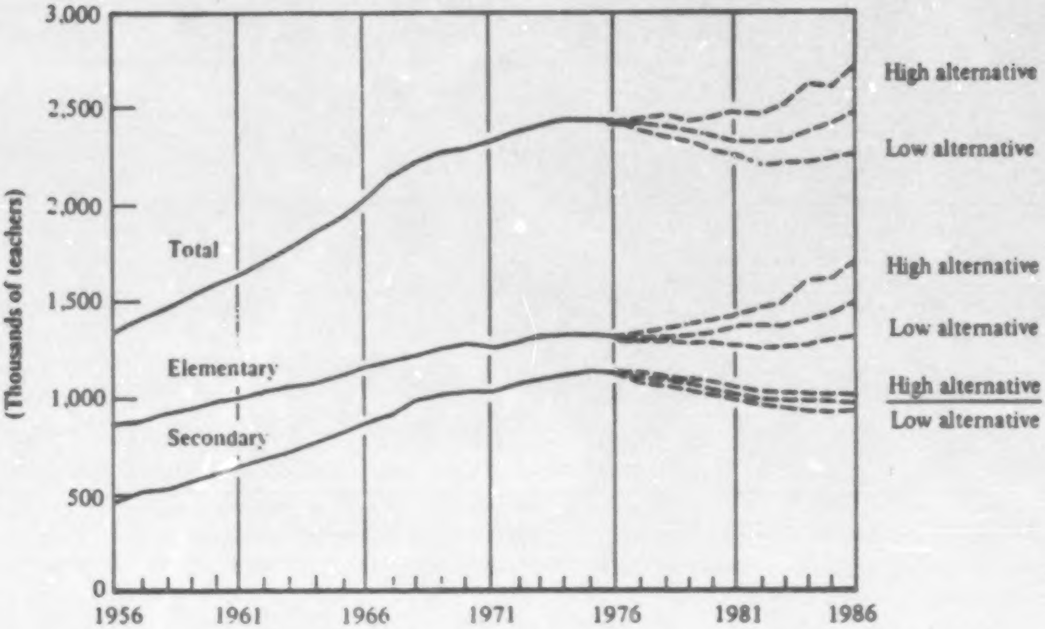
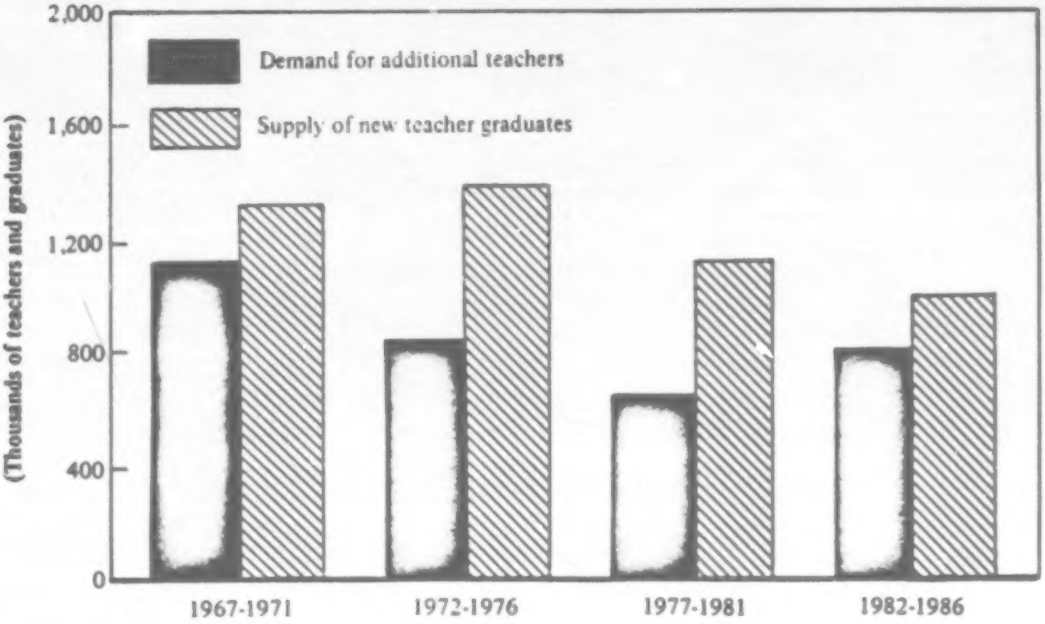


Figure 3.–Estimated demand for additional teachers in regular elementary and secondary day schools, and estimated supply of new teacher graduates, 5-year totals: United States, fall 1967 to 1986



Health, Education, and Welfare (1978) data in Figures 2 and 3 parallel Figure 1. The high employment years of 1967-71 created the surplus discussed previously, but the gap narrowed slightly as both employment and production decreased until in the early eighties when differential is similar to the late sixties. Figures 2 and 3 suggest some planning parameters for teacher education programs. The trend in secondary education is downward as the pinched population profile moves into the secondary schools. However, elementary employment will remain constant or on the increase. So the future appears to be in elementary education for the next decade.

How Does Natural Resources and Environmental Education Unemployment Compare with Other Majors?

The 13 percent total unemployment rate of Natural Resources and Environmental Education is not different than other comparable teaching majors (Table 3). Agricultural education, where unemployment is virtually nil, annually has more positions than graduates, which is supported by this data.

TABLE 3

The Number of Unemployed Students Per Year in Selected Education Majors and the Total of All Teaching Majors

Year	Natural Resources & Environmental Education	Natural Science Education	Social Science Education	Agriculture & Natural Resources Education	Total of Teacher Education
73-74	$\frac{2}{11}$(18%)	$\frac{14}{103}$(14%)	$\frac{8}{68}$(12%)	$\frac{0}{9}$(0%)	$\frac{162}{1256}$(13%)
74-75	$\frac{4}{38}$(10%)	$\frac{5}{63}$(8%)	$\frac{5}{34}$(15%)	$\frac{0}{14}$(0%)	$\frac{122}{913}$(13%)
75-76	$\frac{8}{50}$(16%)	$\frac{10}{62}$(16%)	$\frac{8}{26}$(31%)	$\frac{1}{12}$(6%)	$\frac{152}{961}$(16%)
76-77	$\frac{6}{50}$(12%)	$\frac{1}{51}$(2%)	$\frac{0}{14}$(0%)	$\frac{0}{9}$(0%)	$\frac{104}{761}$(14%)
77-78	$\frac{6}{46}$(13%)	$\frac{6}{16}$(10%)	$\frac{1}{9}$(11%)	$\frac{1}{21}$(5%)	$\frac{65}{668}$(10%)
Totals	$\frac{26}{195}$(13%)	$\frac{36}{296}$(12%)	$\frac{22}{151}$(15%)	$\frac{2}{65}$(3%)	$\frac{605}{4559}$(13%)

The average university unemployment rate over those five years was 10.7 percent. Natural Resources and Environmental Education unemployment figures are not good, but alternatively, the unemployment is not that much greater than other comparable majors in the university. The weakness of that conclusion lies in those non-reporting. Probably a major proportion of the non-reporting were also unemployed.

Generally, underemployment means employment in which a college degree would not be necessary, so in this study secretaries, laborers, and retail clerks, for example, were categorized as underemployed. The rate of underemployment during the five years studied averaged 18 percent.

Do Natural Resources and Environmental Education Students Have an Underemployment Problem?

TABLE 4

Number of Graduates Underemployed Per Year in Selected Education Majors and the Total of All Teaching Majors

Year	Natural Resources & Environmental Education	Natural Science Education	Social Science Education	Agriculture & Natural Resources Education	Total of Teacher Education
73-74	$\frac{2}{11}$(18%)	$\frac{14}{103}$(14%)	$\frac{16}{68}$(23%)	$\frac{0}{9}$(0%)	$\frac{194}{1256}$(15%)
74-75	$\frac{4}{32}$(11%)	$\frac{15}{63}$(24%)	$\frac{12}{34}$(35%)	$\frac{0}{14}$(0%)	$\frac{227}{913}$(25%)
75-76	$\frac{6}{50}$(12%)	$\frac{7}{62}$(11%)	$\frac{8}{26}$(31%)	$\frac{0}{12}$(0%)	$\frac{116}{961}$(12%)
76-77	$\frac{11}{50}$(22%)	$\frac{3}{51}$(6%)	$\frac{2}{14}$(14%)	$\frac{0}{9}$(0%)	$\frac{50}{761}$(7%)
77-78	$\frac{12}{46}$(26%)	$\frac{2}{60}$(3%)	$\frac{0}{9}$(0%)	$\frac{0}{15}$(0%)	$\frac{27}{668}$(4%)
Total	$\frac{35}{195}$(18%)	$\frac{41}{296}$(14%)	$\frac{38}{151}$(25%)	$\frac{0}{65}$(0%)	$\frac{614}{4559}$(13%)

As illustrated in Table 4, there is a disturbing upward trend in underemployment during the last two years. For comparison, Natural Science Education graduates averaged 14 percent and Social Science Education averaged 25 percent underemployment. However, both trends are strongly downward following decreased enrollments in those majors. Natural Resources and Environmental Education numbers were not declining over the same time period.

The much more insidious problem of part-time employment is more difficult to assess from these data. Currently, federal programs such as the Youth Conservation Corps and the Young Adult Conservation Corps provide temporary employment in summer months. The remaining months are often spent unemployed. The result may be that underemployment is much greater than this data suggests. Alternatively, the federal programs are providing invaluable experience which may improve employability in the future and currently provides survival income.

Does Having A Teaching Certificate Improve Employability?

The difference between graduates with certification and those without certification on percent unemployment is only 1 percent (13 percent for the certification group versus 12 percent for the non-certification group). A slight difference between the two groups was evident in underemployment. Eleven (9 percent) of those with certification were underemployed and 13 (16 percent) of those without certification were underemployed. Because the non-teaching option was viewed as less employable (without this data), the departmental coordinators removed that option as an advising alternative. However, the data reported here do not justify that decision.

But the non-reporting category could modify that conclusion. The non-certification people had a much higher percentage (35 percent) not reporting than did the certification people (16 percent). If as expected, the majority of the non-reporting were unemployed or underemployed, then dropping the non-certification could be better defended.

Does Participation in an Internship Program Improve Job Placement?

A total of 19 (10 percent) of our Natural Resources and Environmental Education students have participated in a variety of term-long experiential education programs which we call a 13th Term Internship Program. From that small group, 4 (21 percent) were unemployed and a similar group were underemployed. This percentage is, in fact, slightly higher than the Natural Resources and Environmental Education average of 18 percent. Therefore, the tentative conclusion must be that the intern experience does not improve employment opportunities based on these small numbers.

Implications

Many implications exist for potential environmental educators and for institutions planning environmental education majors. For the student, it is imperative that environmental education be combined with a different cognitive area (Bowman 1978). The best potential combinations would include a double major with one major being environmental education, or a major in a traditional subject area with a minor in environmental education, or a major in environmental education and then a minor in a high-demand subject area (Tables 5 and 6). If the latter approach is taken, completion of as many credits as possible related to the selected minor field is mandatory. By maximizing the minor credits, obtaining certification in states not offering environmental education as a major will be much easier. Any of the sciences would be an appropriate major combination with environmental education. Student advisers should inform students of the limited job potential based on the data included in this paper and encourage students to follow one of the recommended preparation patterns. The double major would be the most desirable route.

Implications for institutions are not unlike the recommendations for students. For best employability in teaching, the environmental education program should encourage and facilitate combining environmental education with other subject areas. If that option is not possible, then a minor is the next best alternative. If a major is the only option, then the curriculum design should be such that a student can readily meet state requirements for other majors, or a very strong preparation in the minor area, or several minor areas of study should be offered to improve their versatility.

Non-certified environmental education students are competing for the same types of positions as Forestry, Fisheries and Wildlife, and Parks and Recreation graduates. Students need to be aware of overlapping job pools so that they can adapt their programs to provide alternatives to the potential employer.

This preliminary study has also raised some interesting research questions. Longitudinal or cross-section studies on employment trends for majors like Natural Resources and Environmental Education are needed to provide monitoring of program quality and quantity. Colleges and universities need to be informed about the career alternatives and employment statistics to properly advise their students and change their curricula.

Underemployment is an issue worthy of further study. Follow-up on graduates working with state and federal programs could provide valuable planning information for the responsible agencies. Information concerning those work experiences can assist in developing experiential education programs which contribute to future employment as well as to individual development.

TABLE 5

Elementary and Secondary Teacher Education Report Based on Supply and Demand for Graduation in 1979-80

Relative Demand Categories

LOW SUPPLY/HIGH DEMAND
(Category 1)

- Counseling (M.S. & 3 yrs. exp.)
- Diagnostician (Ed.S. or Ph.D.)
- Industrial Arts
- Learning Disabilities (M.S. & exp.)
- School Social Worker (M.S.)
- Vocal Music

POSSIBLE SHORTAGE/GOOD DEMAND
(Category 2)

- Agricultural Education
- Business Education
- Chemistry
- Data Processing
- Deaf Education
- Distributive Education
- Driver Education
- Earth Science
- General Science
- Journalism
- Librarian
- Mentally Handicapped
- Physical Science
- Physics
- Reading Instruction
- Swimming Coaching
- Visually Handicapped
- Wrestling Coaching
- Mathematics

NEAR BALANCE
(Category 3)

- Art
- Basketball Coaching
- Emotionally Disturbed
- Football Coaching
- Home Economics
- Instrumental Music
- Physically Handicapped
- Spanish

ADEQUATE SUPPLY
(Category 4)

- Baseball Coaching
- Child Development
- English
- German
- Golf Coaching
- Physical Education
- Speech Correction (M.A. required)
- Tennis Coaching
- Track Coaching

SURPLUS
(Category 5)

- Biology (also certified in General Science)
- Conservation/Nat. Res. Educ.
- Economics
- Elementary Education
- French
- Geography
- Government
- Health
- History
- Latin
- Political Science
- Psychology
- Recreation
- Russian
- Social Studies
- Sociology
- Speech
- Theatre

Definitions

Low Supply/High Demand--many more positions than college graduates
Possible Shortage/Good Demand--few more positions than college graduates
Near Balance--approximately as many college graduates as positions
Adequate Supply--few more college graduates than positions
Surplus--many more college graduates than positions

Source: Scheetz 1979

TABLE 6

Professional Personnel Report for Michigan Public Schools

1976-77

	# of Teachers By Category	% of Total Teachers All Subjects (112,619)
Science		
Biology	1,186	1.05
Chemistry	526	.47
Physics	344	.31
Geology	164	.15
Astronomy	7	.00
Science	3,864	3.43
Total Science	6,091	5.41
Mathematics	6,206	5.51
Environmental Studies	48	.04
Social Science		
Economics	139	.12
Geography	478	.42
History	2,085	1.85
Political Science	392	.35
Psychology	151	.13
Sociology	179	.16
Anthropology	10	.00
Cultural Studies	17	.01
Behavior Studies	12	.00
Social Science	4,542	4.03
Total Social Science	8,005	7.11

Source: Sheetz 1979

Internships or experiential programs are promoted as a way to greater employability. But the small sample reviewed in this paper does not support that idea. However, much more data are needed to verify that statement. Also, further research is needed to identify the qualities or characteristics of those experiences which most contribute to the goals of the individual.

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THE PAST

Thomas Tanner, *FORMATIVE INFLUENCES IN THE LIVES OF CITIZEN CONSERVATIONISTS.*

FORMATIVE INFLUENCES IN THE LIVES OF CITIZEN CONSERVATIONISTS

Thomas Tanner[1]

Abstract. *Environmental educators must prepare curriculum materials and teaching strategies with incomplete knowledge of the kind of learning experiences which actually produce active, informed, responsible citizen conservationists. Therefore, a select group of persons believed to represent such a population has been asked to submit autobiographical statements about the formative influences in their lives. Preliminary data from the first 45 respondents are presented, summarized, and discussed.*

Background

I have long had strong interests in resource conservation and environmental quality. In the mid-sixties, I began to note that, as I talked with persons having similar interests, they inevitably seemed to have had early life experiences similar to my own--a rural environment which they frequently explored, often with fishing rod or rifle in hand, and frequently alone or in the company of one or two friends. By the early 1970s I had continued to note this phenomenon, both in conversation and reading biographical or autobiographical statements about conservationists. Simultaneously, as an environmental educator, I was growing concerned about the fact that 75 percent of today's youth are raised in urban-suburban environments, with no opportunity for the quality and quantity of experience which I had been noting in the lives of conservationists. Yet, at this same time, many young people were active in the new environmentalism. Were their life experiences in any way systematically different from their non-conservationist age mates, or from older conservationists?

At this time, I decided that it was important for environmental educators to know more about formative influences in the lives of citizen conservationists of various ages. By starting with the desired "end product" and examining their lives in retrospect, we might be better equipped to provide the essential educational experiences, and avoid wasteful ones. For instance, if my growing hypothesis was correct, then a typical week-long resident outdoor school experience for a "madding crowd" of urban-suburban sixth-graders might be of little if any value in meeting the penultimate goal of environmental education--the education ("production," if you will) of an environmentally informed and politically active citizenry. Yet, given all the constraints of reality, what better alternative can the schools offer? The thought was sobering.

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To the best of my knowledge, the appropriate research had not been done. So, early in the 1970s, I submitted research proposals to eight foundations. I received eight rejections. This setback delayed the research until late last summer, when I decided that the questions were too important to go unasked.

Population, Sample and Methodology

The population of interest was that of environmentally informed and politically active citizen conservationists. I felt that this population would be reasonably represented by chapter officers and professional staff of The Nature Conservancy, National Wildlife Federation, National Audubon Society, Sierra Club, and five other citizen conservation groups. In October, 1978, two letters were sent to a senior executive of each. One was a cover letter, asking if the executive would distribute an enclosed letter to "appropriate professional staff" of the organization, including field staff. The cover letter also requested the executive's suggestions and assistance in reaching other qualified members of the organization. The enclosed letter (see Appendix) was addressed "Dear Citizen Conservationist," and requested four items of information: (1) an autobiographical sketch of formative influences or events, as perceived by the respondent, with approximate years, e.g., "the early 1950s"; (2) a brief resumé of conservation activities and accomplishments; (3) the respondent's (approximate) age; (4) the respondent's preference regarding direct quotes and anonymity in any report of this research which I might prepare.

The letter briefly explained why I, as an environmental educator, was interested in this information. It assured the recipient that it was being given limited distribution to persons who seemed as a group to meet the criteria of knowledge and activism. I avoided mentioning my hypotheses, or stating any example influences, since to do so might influence the responses.

This initial correspondence brought assistance from executives of the four organizations named above, and the "Dear Citizen Conservationist" letter was distributed between October, 1978 and January, 1979. In the following four paragraphs, the number of usable responses received from each group is shown in parentheses. A usable response is defined as one in which at least one formative influence is cited, and in which the resumé does not disconfirm the criterion of informed activism.

National Wildlife Federation (NWF). The executive distributed five letters to central office staff members (4), and I sent letters directly to nine conservation consultants (0) and twelve regional executives (1).

The Nature Conservancy (TNC). The executive distributed 26 letters to central staff (2), and I sent letters directly to 23 regional executives (3) and 39 chapter chairpersons (9).

National Audubon Society (NAS). The executive distributed an undetermined number of letters to central office (5) and field (6) staff members.

Sierra Club. Using a mailing list provided by the executive I sent letters directly to 36 central offices staff (3) and 20 field staff (1).

With each letter I sent to NWF and TNC persons, I enclosed six copies to be distributed to others whom the recipient judged to be environmentally informed and politically active. The quality of resumés received in response to this secondary distribution indicated that it had reached qualified persons. There were 11 usable responses, which combined with the 34 from the primary distribution brought the total to 45.

The low response rate from these very busy people was anticipated, and does not concern me. The respondents' inclination to respond seems unlikely as an important source of bias which would systematically differentiate them from the population of interest, on the causal variables which I was seeking to identify. Nevertheless, future research in this line of inquiry might use standard follow-up techniques in order to try to obtain larger returns.

The 45 usable responses were subjected to content analysis.

Results

I must emphasize that this is an initial inquiry into what is, to the best of my knowledge, a new line of research. Therefore, it is marked by qualitative data, simple head counts, and very tentative conclusions, and not by hypothesis-testing, statistical inference of interacting relationships, or a sophisticated research design. Also, I have not yet completed all the possible analyses to which the 45 responses might reasonably be subjected. Those analyses completed to date reveal the following influences, which prevailed during the respondents' childhood and/or adolescence unless otherwise noted.

Out-of-doors. Interaction with natural, rural, or other relatively pristine habitats. This factor is mentioned prominently by 35 respondents; suggested, implied or mentioned in passing by nine, and not mentioned by one. The second category includes two persons who say that their parents instilled a love of nature, three who note the influence of a youth group (Boy Scouts, Camp Fire Girls, German Youth Movement), one a school environmental program, and one, summers in the Rocky Mountains. The other two mention a lifelong interest in the out-of-doors, but do not elucidate further. Most of the 35 describe the influence of childhood habitats, as discussed later.

It should be noted here that a respondent's failure either to mention or expand upon a particular influence does not necessarily indicate the absence or unimportance of that influence. In some instances, this may be an artifact of a brief response letter--most of the nine persons in the second category above sent brief responses, for example. In some instances, especially in a short letter, a person may simply have forgotten to mention a significant influence. In others, an influence may be strongly implicit but not made explicit, as we shall see.

Habitat. Frequent, perhaps daily, contact with natural, rural, or pristine habitats; either year-round or during summer vacation. Of the 35 who describe the out-of-doors as a prominent influence, 26 clearly indicate the presence of this factor and one rather clearly indicates its absence (her desire to be in the out-of-doors was gratified "not often, as I was raised in cities"). Another eight responses are somewhat ambiguous on this factor, although five of these strongly imply its presence. For instance, one of these respondents had "many opportunities to experience the outdoors as a child"; another spent "winter days walking near the edge of the frozen river in Indiana (looking) at the muskrat houses"; another spent much time hunting and hiking on a friend's wooded property, and so on. Of the other three ambiguous responses, two briefly mention hunting and hunting/fishing/camping as major boyhood interests of the respondents, thus implying some frequency of outdoor activity.

Among the 26 respondents who give clear positive responses on this item, eight were raised on farms, seven in rural towns, two in "the country." Three others were reared in city, suburb, or bedroom community with vacant lots or undeveloped areas easily accessible. Three others grew up in towns with easy access to open areas, but whether the towns were rural or suburban is not clear. The remaining three cite summer vacations and weekends as giving the opportunity for frequent out-of-doors experience. One of these, a male, worked summers and weekends on a farm, while two female respondents mentioned summer camp or summers "spent camping, canoeing, rafting, climbing."

Solitude. Frequent contact with relatively pristine habitats, either alone or with just one or two friends. Three cite solitude and its importance in their lives; two others frequently explored with one sibling, and another with his best friend. This factor seems to be implicit in a considerable number of the statements; further research would certainly be required to establish its importance or lack thereof.

Parental Influence. Cited by 21 respondents, of whom about half seem to note this as the major influence, or as one of two or three major ones. Six males mention their fathers' (4) or their families' (2) hunting and fishing. (In the study, 37 of 45 respondents are males. Of those mentioning parental influence, eighteen of 21 are males.) Three respondents cite family walks or camping. Thirteen speak of a more general parental encouragement of out-of-doors or nature-oriented interests, while four others note that while their parents may not have actively promoted this, they cheerfully tolerated the child's interests. Of the former group, seven referred to their mothers, three to fathers, and three to "family." Finally, one respondent describes his father's efforts to restore a worn-out farm as his major influence. These references total 27, since six of the 21 persons cited two each.

Specific Outdoor Activities. Fishing, during childhood and adolescence, is named by 13, of whom three specify it as one of only two or three major influences. Additionally, one female who began this activity at about age 30 names it as a major influence, as does one male who put in two summers as a commercial fisherman sometime prior to age 24.

At least 15 of the male respondents were hunters; for one this was the single major influence and for at least two it was definitely a major one. Five of these hunters also mention trapping. Three hunters describe a specific hunting event which caused feelings of remorse followed by a self-imposed limiting of this sport, while a non-hunter reported similar strong negative feelings at age five with respect to his father's hunting.

Three respondents engaged rather extensively in such activities as backpacking, rockclimbing, snow-shoeing, and cross-country skiing "in national parks and wilder regions," as one reply put it. The terms "hiking" and "walking" are used in a number of replies, but seem to represent a variety of activities, such as solitary wanderings or family walks, which are examined under other categories in this report. Only one response mentions a summer youth camp, and that individual's father was the director--the respondent herself was not a camper. Six others mention "camping" as an influence. Three specify canoeing.

Birdwatching or bird identification is reported by eight men and two women, and was apparently a major influence for at least three or four of these ten individuals. Six began this activity as children or adolescents; three, as adults; one, at an unspecified age. An interest in identifying or understanding other fauna, flora, or natural objects and phenomena is stated or strongly implied in at least twelve additional statements and may be implicit in most of the remaining ones.

Teachers. Fourteen respondents cite a total of 22 teacher influences. A single series of influential professors' names is here counted as one teacher influence, as is a single reference to a group of teachers at any one academic level, e.g., "a biology teacher and an English teacher at my high school." A school program is counted as a formative influence if clearly described as such. Of the 22 influences, three refer to school programs, 19 to specific teachers or their programs, singly or as a group, as noted just above. The influences were at the following grade levels: elementary, one (the major influence in this respondent's life was identified as his second grade teacher, an enthusiastic birder); junior high, two; senior high, six; undergraduate, nine; post-graduate, four. Among the 19 teachers or groups of teachers, four are cited for noting and encouraging the student's interests in concrete ways. Two of these (one a college registrar, one a high school teacher) gave appropriate career guidance. Of the other two, one was an eighth grade English teacher who encouraged the respondent to write a prize-winning essay on his nature interests, and one was a college zoology professor who gave much extra time to a freshman with keen interest in natural history. Again, it may be supposed that other such contributions were made to various of my respondents, but were not reported by them.

I examined the point in each respondent's history at which there was teacher influence. Two teachers or programs are credited with establishing initial interest in the natural world or environmental matters. One of these was the second grade teacher mentioned above; one was a junior high environmental studies program which founded "moderate" interest in one urban youth. Five teacher influences reinforced preexisting student interest; these influences ranged from junior high to post-college. Three other teachers (high school, college, and post-college) drew upon existing interest to make a strong influence upon career choice. Five teacher influences, all college or post-college, are cited as having sharpened the respondents' perceptions or understanding significantly, after the career choice had been made. Seven teacher influences, all high school or college, represent one or more of the last three categories (reinforcement of existing interest; career decision; post-decision horizon-widening); there is insufficient information to determine which.

Here, "career" refers either to the person's profession or to his volunteer work in environmental protection, as appropriate to each individual case.

Other Adults. Twelve replies mention the direct influence of adults in addition to, or rather than, that of parents and teachers. In nine cases the respondents were influenced as adults, in three cases they were in elementary or high school. The nature of these influences is diverse. One respondent, when a graduate student in physical geology, developed wider interests in the natural world after marriage, since his wife was interested in entomology and ornithology. Another, in college, was profoundly impressed when another student edged without comment into a mountain crevice to retrieve a Coke can which the respondent had just discarded. Another gives credit to her husband's kind indulgence of her interests. Another first became involved in activism when spending summers with her aunt in an isolated former copper mining camp, population eight souls, on the rim of Hell's Canyon. She was pressed into composing and typing everyone's letters to Congress, both pro-dam and anti-dam. One respondent was given a boost by a birder whom he and his brother met on one of their frequent boyhood explorations; this person lent them books and binocs for their first serious identification, and this evolved over the years into the development of two career conservationists. The father of another respondent's best friend was a forester; he was not often home but provided an attractive career role model for a boy who already had great interest in the out-of-doors.

Habitat Alteration. Fourteen respondents report witnessing the development of their beloved open spaces. Three mention this in passing, without stating whether it was an influence, although one of these noted "with remorse" the change of his boyhood haunts into subdivisions. The other eleven definitely give this as an influence, and for several it was clearly a major one. Two of the eleven noticed the changes as adults, one at an undetermined age, one as a teenager or young man, and seven noticed and became concerned during adolescence or before. Excerpts from four responses convey something of these persons' feelings: "I couldn't understand why people would destroy the most beautiful parts of our town." "As lots would be built one upon another, I would cry and feel very sad." "I remember how upset and irate we boys were when the lots were developed into housing complexes. All at the tender age of 8 or 10." "I was becoming more and more upset about the disappearance of my 'wild' places . . . . for some reason that was wrong and unfair, not only to me but to my Giant Swallowtails, who had been squeezed out of the places they used to live."

Books. Books are reported as an influence by 13 respondents, many of whom ascribe some importance to them. Eight mention their influence during childhood or adolescence; two of these plus three others describe their influence during adulthood; two others, at an undetermined age, though one was apparently a teenager or young adult, and we know that the other did have well-developed interests in nature as a child. While three of the 13 make a general reference to "bird books," "natural history books," or a "conservation library," the other ten name specific authors or titles. Peterson's field guides to birds are cited four times, while three respondents mention the impact which the stories of Ernest Thompson Seton had upon them as children. Two of these are men aged 62 and 73, and one a 32-year-old woman.

Ten of the 13 mention nature-oriented books, including Peterson and Seton, while two describe books on ecology, human ecology, or environmental issues, and the other was influenced by the writings of philosophers. Nature readings are the types mentioned by all eight of those who describe the influence of reading as children or adolescents, plus one who mentions reading as an adult and one at an undetermined age. Of the two who mention environmental-ecological books, one read these as part of his continuing growth in recent years (he is aged 47), and the other was influenced by Silent Spring as a teenager or young man. (He had grown up in the Connecticut coastal salt marshes; when he read the book he had already been observing with deep concern the decline of ospreys there, due to DDT poisoning.)

Miscellaneous. The lives of at least five respondents were shaped in part by overseas experiences. After college graduation, one man wandered the New York docks for two weeks, got a job on a Norwegian merchant ship (he was the only American aboard), and sailed to India and the Middle East. The "awesome power" of the sea and the diversity of people and places prepared him to receive the words of Loren Eisley's Immense Journey, which in turn prepared him for the works of John Muir, all of which prepared him for his subsequent and rather sudden career decision.

A Peace Corps stint in Nepal made another respondent sharply aware of the imbalance between humans and nature in the U.S. as compared to more traditional cultures; this was one of three major influences he cites. Another man had a more or less opposite experience. He grew up a naturalist in rural Texas, took a degree in biology, joined the Air Force, and was stationed in Spain for his last three years. The agricultural overdevelopment and human overcrowding of that country shocked him and his wife, and upon their return stateside they were at once sharply aware of the same processes occurring here. At that point he evolved from a naturalist into a conservationist.

While living in Japan for two years in his early thirties, one respondent "started to develop an intense interest in foreign affairs"; much of his subsequent environmental work has been for the United Nations. A fifth respondent had "in the past done a good deal of shooting and fishing in Africa and India," an activity which led to his interest in conservation overseas.

For many of the respondents there was a continual growth from childhood interests to adult conservation work. Several others, however, describe a different course: childhood interests in nature and the out-of-doors, followed by a latent period during which non-related career pursuits prevailed, and then a dedication to conservation either as a professional or as a citizen. Sometimes this last phase was triggered by a distinct experience. One man's life was changed by wilderness trips in his early thirties, after his having lived in New York City for twelve years. Another, in his first year of law school and bored with his studies, happened to pick up and examine the Sierra Club book, Yosemite. "Everything fell together" and his life direction changed. Another, traveling with the Fred Waring chorus and orchestra, talked at every opportunity with natural history professors at the campuses visited by the group, and this experience helped him to change directions. The father of one respondent encouraged his avid interest in nature as a child but then, when he entered high school, began directing him toward a medical career. The respondent reports that the great interest of his childhood was literally put behind him during his high school and college years. His interest was rekindled by a single, simple event--his bad luck in trying to obtain a place in medical school.

The reports of two respondents, aged 50 and 62, are not encouraging. Both had worked for a federal resource agency, but felt they could not be effective until they had retired (in one case) or resigned (at age 44, in the other). They had found that civil servants are under considerable pressure from within their agencies and from outside interests, and that they must maintain a low profile and considerable silence or risk their careers. Both of these respondents claim that citizens wishing to protect the environment must act directly and must support citizen conservation groups. Said one, "They should realize that they cannot depend upon brow-beaten bureaucrats to look after the public interests."

Discussion and Implications

At this point, it should perhaps be emphasized once again that this is a preliminary, exploratory study. There is more information to be gleaned from the 45 reports, and there is ample opportunity for new research on this topic.

Youthful experience of the out-of-doors and relatively pristine environments emerges as the predominant influence in these lives. This finding may be regarded as unsurprising, or even as an affirmation of "common sense." But if so, it is a remarkable affirmation. The "Dear Citizen Conservationist" letter bore no suggestion as to what might constitute an influence, yet 44 of the 45 replies cite this type of influence, 35 of them quite prominently. Not one respondent said anything such as, "I grew up in the city impressed by how awful it was"; these people were motivated by positive experiences in relatively prestine habitats.

For at least 26 of the 35 (more than half of the 45), these habitats were accessible on a more or less daily basis, and in most cases they were probably enjoyed when the respondent was alone or in the company of a few others at most. (This last factor is strongly suggested but not clearly demonstrated by these data, and requires further inquiry.)

It must be noted here that the respondents represented four citizen groups which, though they deal with a wide range of environmental concerns, historically have their own roots in the preservation of wildlife and wild places. A future research effort should be directed at the origins of those who are active in other kinds of environmental issues, such as energy conservation and alternative energy sources.

Among specific outdoor activities, the prevalence of hunting among male respondents is noteworthy. The data suggest that traditional childhood sex roles were very important, a result which had not occurred to me before the data were examined. This factor should be examined in future research.

Parental influence, mentioned by 21 of the 45, was clearly important. Teachers, noted 22 times in 14 replies, seem to be remembered as individuals rather than as purveyors of school programs. They were either enthused about study of the natural world or they showed interest in the student and his interests, in a human way. They had influence at any point in the student's development, from primary grades through postgraduate study, or from initial interest in nature to career choice to postgraduate sophistication of concepts and perceptions.

Witnessing the development of beloved places was important to at least one-fourth of this group.

They found books important at any early age. These were books that were interesting to them, rather than books filled with abstract concepts, problems, and issues. Indeed, all of the data in this study seem to support my long-standing hypothesis that children must first learn to love the natural world before they can become profoundly concerned over maintaining its integrity. I have written of this elsewhere (Tanner, 1974).

Some of the questions which led to this investigation have not yet been asked of these data. Are younger conservationists primarily urban, and older ones rural? Are there important differences, and important similarities, between the backgrounds of the two groups?

Factors still to be investigated in these replies or in future research include, for example, the opportunity to work out-of-doors (several respondents mentioned this) and the economic status of the parents—the financially secure are in a better position than are others to pursue their interests, to work for low or no pay for a public-interest group, and to speak out on controversial issues.

I shall attempt to draw few educational implications from this study, except to note that the hypotheses and concerns which led to it have tended to be confirmed, and the importance of knowledgeable, enthusiastic, humane adults has been brought home to me as well. Can a teacher of average training and enthusiasm lead a class of 30 urban-suburban children into a pristine environment with reasonable hope of advancing the cause of environmental quality? For that matter, how many such teachers, how many environmental educators, perceive this as the ultimate and central goal of environmental education? These are as yet open questions; I posit that they are important ones.

The responses from the two former federal employees suggest that the study has implications for career education; other work I am doing at this time--not formal research--reveals that high school students are surprised to learn of the severe restrictions upon speech and action which federal agencies and other institutions may place upon their employees. I would hypothesize similar naiveté among many adults, including teachers. Formal research among students and teachers, and confidential investigative research among resource agency personnel, could be very interesting.

A comment upon the research methodology used. For three reasons, I am pleased that I solicited essays, rather than responses to a questionnaire. First, I believe now, as I did at the outset, that the method was appropriate in this initial inquiry into a new research area. I did not want to eliminate genuine formative influences from consideration through my ignorance of them. Second, I am pleased because so many of the respondents enjoyed participating. That they did so is obvious from the length, spontaneity, and openness of their comments. (Recall that I did guarantee anonymity and non-quoting to any desiring this protection of privacy.) Third, I am pleased because I enjoyed reading the replies as much as they enjoyed writing them. These are vital people with interesting backgrounds and lively thoughts, and I am glad that I now "know" them. I would like to share them a little more with the reader, for our mutual interest, by presenting a sample of sketches.

The former Fred Waring musician now lives near the last remaining colony of 40-odd California condors and works full time at their protection. The crewman on the Norwegian vessel, later the bored law student, went on to finish law school, practiced for a time, and is now the Washington, D.C. representative for one of the conservation organizations previously named. One respondent's avocation for the last eight years has been the restoration of a sugar mill on a small Caribbean island. One went from being a teacher and school administrator to executive director of the Nature Conservancy. One was the leader of a fund drive to save a native prairie, is a member of several conservation organizations, and was a member of a Corps of Engineers planning committee for river channelizing. (Many of the respondents show such balanced and even conservative, pro-establishment tendencies. Not wild-eyed radicals, these.) The man whose tour in Japan initiated intense interest in international affairs is today one of America's pre-eminent environmental educators and directed UNESCO's EE program. The woman who dropped the Coke can in a crevice is today developing a master plan for educational use of her organization's nature preserves throughout the state of California. Another woman, at about age 50, obtained a Master of Arts in Public Administration, has subsequently served in many significant environmental protection roles, and was a state president of the Izaak Walton League for two years. The man who retired from the federal resource agency has since founded a state chapter of one of the named citizen groups. A consulting geologist has advised the old Atomic Energy Commission on underground disposal of nuclear wastes, about which he seems quite optimistic; he is also a member of various ornithological groups and has been a state president of The Nature Conservancy. Another has been a lifelong professional in the field of conservation, and retired in 1973 as Executive Officer of the California Wildlife Conservation Board; he is a director of the National Wildlife Federation, has also been a very active citizen in cancer control work, and expresses his concern over some of the emotional and political aspects of the new environmentalism. One of my respondents claims no great accomplishments as a conservationist, though I noted elsewhere in her response that she has raised $20 million for land preservation. Another has managed the Audubon Society's wildlife sanctuaries for the past 13 years. Before that, he spent 16 years managing a duck hunting preserve owned by about 24 wealthy sportsmen. He directed a staff of nine trappers, fourteen guides, and two chefs, plus waitresses and maids. (My mind boggles.) Throughout his career he has directed wildlife research--much of it sponsored by those sportsmen--and is a winner of the prestigious American Motors Conservation Award. Several persons were newspaper outdoor columnists; this perhaps explains their willingness to write me a newsy response. One of these is today the editor of Audubon magazine, which has gained an outstanding reputation during his tenure (my observation, not his). The magazine's picture editor was one of those respondents raised on Ernest Thompson Seton; she is co-founder of an organization which quickly provides assistance for endangered species in critical situations.

The Society's publications editor has in her journalism career written and edited conservation and outdoors publications for the Sierra Club, the Conservation Foundation, and others. The last response in my pile is from the Properties Director of the Society. Working out of his New York office, he evaluates properties offered to Audubon as preserves or nature centers. As is the case with 41 of my other respondents, I have never met him in person. But when I leave my office today to run a shopping errand at the North Grand Mall, the Ames High School Prairie which he helped to save while a student here at Iowa State will be just a few blocks away. As I drive from near his boyhood home on Sixteenth to the mall beyond Twenty-Fourth, there will be uninterrupted blocks of houses on both sides as far as one can see. Throughout that distance, I will be driving through an Ames that I never knew--the fields and woods where he once caught his Giant Swallowtails.

These are my respondents--my new friends. I am thankful for their responses, and for their being the kinds of people that they are.

I am thankful also for the enthusiasm and comments of warm support which this research has received from such respected environmental educators as William Stapp, John Disinger, Craig Davis, and Harold Hungerford. One of Hungerford's graduate students, Nancy Peterson, has now begun a study of formative influences in the lives of environmental educators. I hope that the work reported here will be a "formative influence" in the research of others, as well.

REFERENCE

Tanner, Thomas. Ecology, Environment, and Education. Lincoln, NE: Professional Educators Publications, 106p, 1974.

APPENDIX

Environmental Studies
141 Bessey Hall
Ames, Iowa 50011

IOWA STATE
UNIVERSITY

Telephone 515-294-7252

Autumn, 1978

Dear Citizen Conservationist:

I am an environmental educator. I teach teachers, who in turn teach children and youths in the elementary and secondary schools. For years, I have been painfully aware that a basic piece of research in my field has not been done. I am hereby asking your help in completing it.

To a degree, we environmental educators are really making educated guesses as to the kinds of experiences which should be provided for young learners, if the latter are to become adults who will be informed and active with respect to environmental issues. It is time that one of us approached such active and informed citizen conservationists and asked, "How did you get that way? What were the formative influences in your life?" Armed with the answers to these questions, we in environmental education might be better able to design the right kinds of learning situations for youngsters.

Will you help? You have been identified as an active and informed citizen conservationist. Will you write a few paragraphs for me? Will you try to remember the formative influences in your life, which you believe may have led you along the path you have followed?

Would you also write a brief resumé of your activities and accomplishments as a conservationist? Finally, will you tell me your approximate age, and identify in your sketch the approximate years when the influences or events occurred? (I think it important to know whether there is any systematic difference between the "generations" of conservationists.)

The use that I will make of this. Your contribution will not be wasted. I will share the results of this study with my colleagues throughout the nation via books, articles, addresses, or curriculum projects, as I frequently have in the past. This will affect the practice of environmental education. The results will also be shared with you, if you so request.

I may wish to quote your sketch at length in any article or book which is produced. Please tell me, when you return your sketch, if (a) you do not wish me to quote your sketch at length or in its entirety, and (b) you do not wish to be identified by name if so quoted. If you do not so tell me, I will assume that I have permission to so quote and/or identify.

OVER

A point of clarification. You may think, "I received this letter second hand. I don't know if I fit Tanner's definition of citizen conservationist." This request was either sent to you directly, or was passed on by someone whose opinion I respect. It has been distributed with appropriate care, so as to reach only those kinds of persons I wish to contact. Whether you are concerned with pollution in metropolitan areas, or wilderness preservation, or alternative energy sources, whether you call yourself an "environmentalist" or a "conservationist," whether you are active at the local or national level, whether you are a staff member of one of the citizen conservation organizations or a volunteer, the letter is meant for you.

Earlier drafts of this letter contained example influences from the lives of some conservationists, and implications which certain results could have for actual teaching practice in the schools. While these helped to clarify and justify my request, I realized that there would be subsequent concern in my profession as to whether this discussion might have influenced your responses. For that reason, this request is rather sparse in its details.

A reminder as to what your response should include:

a) A sketch of formative influences or events, with approximate years, e.g. "the early 1950's." (If you wish to write more than a few paragraphs, that would be fine.)
b) A brief resumé of your conservation activities and accomplishments.
c) Your (approximate) age.
d) Your preferences if you do not wish to be quoted at length and/or identified. (I think there is no cause for concern here, and I presume that most of you will grant permission.)
e) Your wish to receive the results of the research, perhaps in the form of a summary article.

I know that I am asking for sacrifice of time from your already busy schedule. My thanks in advance.

Respectfully and Sincerely,

Tom Tanner

Thomas Tanner

TT:jj

SECTION II:

NOTES AND COMMENTARIES

SECTION II: NOTES AND COMMENTARIES

This Section contains 16 essays which describe and report on a wide range of environmental programs, practices, and experiments, and provide insights of interest to the environmental education community. These insights are based largely on personal experience with environmental education projects, methods, and personalities, rather than on scholarly work and new research. This Section is designed to keep educators informed about new programmatic developments and opportunities in public school systems, institutions of higher education, and governmental agencies at all levels across the nation. At the same time, it is hoped that the papers selected for this Section will provide educators with techniques which they may wish to incorporate in their classes, and with new approaches to stimulate their thinking.

"VIEWS OF THE FUTURE:" AN ENVIRONMENTAL STUDIES WORKSHOP

Jerry Berberet[1]

Four central conclusions emerged from the third annual NAEE pre-conference workshop of the Environmental Studies Section which was held at the Smith Mountain Lake 4-H Center near Blacksburg, Virginia, May 3-5, 1979.[2] Organized around the theme "Views of the Future," the Workshop produced agreement that:

1. The Earth system will experience a series of devastating shocks beginning in the mid-1980s with an intensified energy crisis triggered by severe shortages of fossil fuels. Political and economic breakdowns in the Earth system are likely to follow during the present century in the wake of the energy crisis.
2. The Earth system will be unable to avert this energy cataclysm due to an inability of world society as now constituted to adopt environmentally sound energy alternatives and energy conservation on a scale of sufficient magnitude.
3. The apparent inevitability of the coming crises suggests that educators and policymakers should give priority to development of strategies to rebuild the Earth system along ecologically sound lines after the near-future crises.
4. This futuristic Earth system should be characterized by decentralized political, economic, and social communities coordinated along regional lines emphasizing appropriate technology, energy conservation, waste recycling, and non-material measures of quality of life.

The workshop assembled some 35 environmental scientists, humanists, educators, and students from the United States and Canada to consider key issues which the group anticipates will dominate the environmental agenda of the 1980s and the years beyond. Workshop participants met in three Task Forces to analyze major environmental issues and to develop scenarios depicting alternative images of possible futures in regard to each topic. Individual Task Force work culminated in integrative sessions designed to produce a synthesis around common themes and conclusions, and to discuss the educational and public policy implications of workshop findings.

Questions addressed by each Task Force were stimulated by position papers authored by environmental studies specialists which were distributed to participants prior to the workshop.[3] Task Force topics and position paper authors were:

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[1] College of Liberal Arts, Willamette University, Salem, OR 97301.

I. Energy and Resources

Thomas Detwyler, "Energy, Environment, and Social Change"[4]

II. Behavior and Lifestyles

Gene Bammel and Lei Lane Bammel, "Life Styles, Behavior, and Future Environments"[5]

III. Ethics and Ecology

Kent Shifferd, "A Viable Land Ethic: The Ways Ahead"[6]

Participant critiques of position papers were circulated at the beginning of the workshop. As a result, a diverse body of thoughtful background material, rooted in contributions of participants themselves, was available to provide a scholarly foundation for workshop deliberations. The synergistic quality of the workshop format helped to assure a challenging and meaningful experience, whatever each participant's disciplinary background.

Task Force sessions were designed to model group decision-making for problem-solving purposes in the development of scenarios of the future. Each task force spent several sessions analyzing its respective topic as a basis for creating scenarios presented to the entire gathering during the workshop's concluding sessions.

Guidance in scenario development was provided by Jack Everitt and John Miles who have had considerable workshop experience in writing futures scenarios.[7] Everitt and Miles pointed out that scenarios may be formulated from a variety of assumptions. Indeed, they recommended evolving several scenarios which allow for alternative images of possible futures. They suggested scenario-building procedures that work forward logically in time from present conditions and work backward to the present from conditions projected for some time in the future.

The Task Force on Energy and Resources experienced considerable internal disagreement over the future roles of energy intensive "high" technology and reliance upon fossil fuels augmented by nuclear power. Divisions also occurred in discussions of the continued viability of "liberal" corporate capitalism as a politico-economic system capable of sustaining society in the difficult years ahead.

The group split over Professor Detwyler's contention that socialism is required to develop the steady state society necessary for solving the twin environmental and energy crises. Issues associated with the continued viability of economic growth, large corporate capitalism, and continuance of political institutions dedicated to the economic status quo, therefore, became essential bones of contention. To a lesser degree, the group differed over the extent to which basic cultural values would need to be altered, i.e., traditional American ideals of progress, competition, and private property, to support a successful transition to a more environmentally compatible future society.

Due to these conflicting views, the Task Force split into two groups which developed separate scenarios that differed primarily in the political and economic systems projected as evolving during the next 50 years for energy and resource management purposes. One group, critical of the Detwyler thesis, forecast a global future characterized by ecological crisis and international violence, as nations compete for access to increasingly scarce resources. By 2030 a socioeconomic equilibrium would be achieved in which mass transit, nuclear fusion, and renewable resources would be significant features of an Earth system still prominently democratic and capitalistic.

The second group emphasized that ecological crises would necessitate a kind of regional socialism to decentralize economic power, enhance regional self-sufficiency, and produce an energy-conserving society. Consciously restricting this scenario to North America, the group foresaw the evolution of a powerful ecological ethic at the base of a highly participatory society valuing cooperative means to satisfy human needs.

Not surprisingly, the Task Force as a whole agreed that future society must sustain itself through adoption of energy and resource conservation measures, increased utilization of energy alternatives, and the evolution of a value system more conducive than current attitudes to reduced levels of energy and resource consumption. Both groups within the Task Force also concurred that during the next 25 years a series of heightened earth crises over energy and resource availability seems inevitable.

Unlike their colleagues who assessed energy and resources, the Task Force on Behavior and Lifestyles developed a consensus around the proposition that dramatic changes in values and behavior are not only necessary for society's survival, but desirable to promote an enhanced quality of human life. This group also concluded that the Earth will begin to experience a series of cataclysmic disasters during the mid-1980s caused by depletion of fossil fuels and readily available natural resources.

The requirements of survival will force a decentralization of politics and economics into smaller, more manageable communities organized on local and regional scales. These communities will develop appropriate technological means to meet community needs, with emphasis upon labor-intensive economic activity, community decision-making in politics, and a social life built upon non-consumptive family and community activities. Key values will be constructed around concepts derived from ecology--holism, interdependency, cooperation, adaptation.

According to the Behavior and Lifestyles Task Force scenario, reliance upon high technology, fossil fuels, mass communications, rapid transportation, and corporate industry will continue, but on a restricted scale determined by actual survival needs of the human community rather than the exclusive dictates of the profit motive. Likewise, the group acknowledged that values such as competition, individual freedom, privacy and private property are important underpinnings of human vitality.

The Task Force borrowed eclectically from a variety of cultural values and patterns of organization in describing this future social order. These included a reverence for "Mother Earth" and a style of political leadership akin to the Native American reliance upon a chief. The Task Force also found appealing the emphasis of pre-industrial societies on child rearing as ecological conditioning and the extended Family as a principle of community organization.

Complementing more traditional norms, the scenario stressed contemporary theories of work, leisure time, and private space as important dimensions of quality of life. Achievement of these cultural characteristics would require a variety of incentives to promote perceptions of self-interest built upon nonmaterial measures of human fulfillment.

The group sought a balance between the extremes of present values and structures which are no longer ecologically viable and images of the future that, simplistically, call for merely "flipping to the other side of the coin." To survive, society must adapt its beliefs and institutions to support patterns of behavior which create a man-environment equilibrium.

In postulating this vision of the future, the group acknowledged that certain variables rest beyond the ready control of future human systems. A level of international political disorder could occur during the 1980s crises which could hamper efforts to remake society along ecological lines. Principal among variables which have largely eluded international control are international violence, primarily in the form of terrorism and war, and national rivalries.

The Task Force on Ethics and Ecology acknowledged that future human survival depends upon a close relationship between ethical and ecological principles. Having established this sweeping generalization, however, the group encountered a serious dilemma in discovering significant examples in human history to justify an optimistic belief that man will successfully adapt an environmental ethic or that ecological principles themselves provide much specific guidance for human behavior.

To explore ethical/ecological issues from several perspectives, the Task Force split into two groups. One group developed a scenario of the future to the year 2030; the other discussed general ethical questions for the purpose of evolving an integrated philosophy joining ethical and ecological perspectives.

The scenario group devised an analysis of the next 50 years emphasizing physical, socio-political, and epistemological elements of human society's relationship with the environment. It recognized that physical exploitation of nature is necessary to sustain humankind, but called for this activity to be guided by the principle of distributive justice both to minimize environmental entropy and to assure options for future generations. As with the Behavior and Lifestyles Task Force, the group envisioned the creation of decentralized communities placing a premium upon local, participatory decision making to implement a carrying capacity ethic. Epistemologically, society should reduce the dominant value placed upon scientific inquiry as a handmaiden of technological innovation by expanding the purpose of research to include a more prominent role for less quantifiable values related to environmental quality and quality of life. The impact of impending Earth crises will propel society toward this scenario as a means of survival.

The second ethics and ecology group proposed an ecological ethic combining humanistic philosophy and environmental values derived from ecology. This synthesis rests upon judgments flowing from application of "situational ethics" which allow for adaptation to Earth's rapidly changing conditions while avoiding possibly inflexible and short-sighted rules of ethics, albeit rules derived from ecological principles.

This group grappled with the problem of relating influences shaping human motivation and ecological ethics. Appeals to altruism and applications of models such as the People's Republic of China were rejected because the group concluded that their results have historically been short-lived. Economic "carrots" will be useful short-term transitional devices. The best long-term prospect appears to be the development of groups akin to revolutionary cadres prepared to employ both educational and political tactics to restructure society in the wake of future Earth crises.

After a reporting session in which each Task Force presented its findings and scenarios, the Workshop turned to discussions of the educational and policy implications of its work. Although the Task Forces understandably offered somewhat varying conclusions, a consensus emerged around a number of recommendations rooted in common assumptions about environmental studies, Taken collectively, this consensus has powerful implications, especially for the future of environmental education.

The Workshop developed the concept of dual-focused "appropriate education" to address the conclusion of all three task forces that the Earth would inevitably experience devastating energy crises during the mid-to-latter 1980s. First, education will have the primary responsibility of rearing a generation of youth with the perspectives, values, and skills necessary for adaptation to the steady-state requirements of the 1990s and beyond. Second, education will be the primary means by which the public at large will be prepared to survive the shocks of the 1980s and participate in the long-term reconstruction of society.

To be successful in this monumental task, education must assume lifetime proportions. Essentially, this would involve three phases:

1. A vital dimension in shaping values and instilling a futures perspective in children.

2. A dynamic role in training higher education disciplinarians with the ability to understand environmental analysis and

problem-solving techniques, and to impart requisite knowledge and skills to students.

3. A comprehensive program of adult education designed to inform citizens throughout their lives so that they will be equipped to act responsibly and effectively in terms of the environmental impacts of their private lives and in the development of public policy.

Environmental education will need to emphasize both process and content --methods of acquiring and utilizing knowledge--as a basis for effective environmental action. Environmental educators must strive diligently to be effective role models in order to instill meaningful values. Educators must devise approaches which will portray ecological values, lifestyles, and policies as essentially desirable and attractive expressions of quality of life which appeal to the self-interest of both individuals and society at large. In short, educators and the educational message must portray change and adaptation as facts of everyday life which dynamically affect what people perceive to be centrally important in their lives.

Both the Energy and Resources and Ethics and Ecology task forces depicted significant roles for education. The former group offered qualities of education which they depicted alliteratively as preparation, professional, pragmatic, "practitioning," "profitable," and prophesizing. The latter Task Force offered an inventory of values and themes which should characterize education in its various dimensions. Education should be concerned with themes such as ecology, energy, food, land use, toxins, population, plants, and animals. It should help people to be more caring, sharing, loving, open, accepting, self-actualizing, confident, creative, and cooperative. It should use learning processes which are holistic, learner-oriented, futuristic, democratic, humanistic, varied, participatory, and interactive. Finally, education should create a learning community which is healthful, comfortable, positive, non-threatening, aesthetic, supportive, flexible, and diverse.

Clearly, the comprehensive scope of the Workshop spawned enormous consequences for environmental policy. Its focus upon an activist role for education provided a basis for linking education and policymaking as processes with the common goal of cooperating as complementary activities directed toward the survival of future society. As education produces an environmentally sensitive and "copable" society, public policy will reflect increasingly measures to establish the reconstructed society of the future.

The theme of the Smith Mountain Lake gathering implicitly acknowledges that environmental educators and policymakers must carry the holistic analysis of environmental problems forward into the future. We must do more than simply react to issues as they unfold; we must, as well, take an active role in shaping the framework of the future if we believe that ecological principles of interdependency between man and nature suggest a profound restructuring of society's institutions and the human system's relationship to the physical and biological environment.

Obviously, the Workshop conclusions are controversial. Some will strongly contest our findings; yet scenario development exercises such as those undertaken at Smith Mountain Lake reveal starkly that our present course is fundamentally antithetical to the ecological prerequisite of human survival on the Earth as we know it.

The challenge to those who analyze, educate, and shape public policy is that pioneering efforts must be initiated to insure the potential for new directions in society following the environmental and cultural shocks which hover around the corner of the near future. The fact that the Workshop concluded that little seems possible to avert upcoming crises may discourage us in the short-run. Yet, it seems eminently worth preparing for the longer term human prospect. The Workshop concluded that prospects for the latter dimension seem a hopeful and worthwhile expression of humankind's irrepressible optimism.

The Smith Mountain Lake deliberations, therefore, concluded that the main thrust of Meadows and Meadows' Limits to Growth is inescapable, in spite of scholarly efforts to disprove its monumental implications. After our discussions in the Virginia hills, we, too, feel less sanguine about human society's short-term prospects.

Having experienced this realization, however, Workshop participants concluded that we must not stop here. Society's present institutions will sternly resist the looming near-term disaster, in the process significantly demonstrating the adaptive capacities of human beings. In the belief that these efforts to stave off disaster will ultimately fail, we might best serve the purposes of our species' survival by attempting to lay foundations for the longer-term future. Dissipating our energies by unduly playing a Cassandra-like doomsday role may not only constitute wasted energy but may also damage our future credibility. Besides, in the axiom of humble scholar-educators, we could be wrong!

The clarion call of Smith Mountain Lake would seem to be that environmental educators must foster awareness of contingencies and alternatives in shaping our culture's wisdom in approaching the future. These guiding values will help us be sensitive to ecology's adaptive message while allowing us to shape an image of the future.

REFERENCES

[2] The Smith Mountain Lake pre-NAEE Conference Workshop follows earlier workshops held in 1977 at Estes Park, Colorado, on "Experiential Learning," and in 1978 at Lake Geneva, Wisconsin, on "Systems Approaches in Environmental Studies."

[3] The texts of workshop position papers are reproduced elsewhere in this volume.

[4] Dr. Detwyler is a professor of Geography and Environmental Science at Willamette University in Salem, Oregon.

[5] Drs. Bammel are forest scientists at the University of West Virginia in Morgantown.

[6] Dr. Shifferd is an associate professor of history at Northland College in Ashland, Wisconsin.

[7] Dr. Everitt is Dean of Continuing Education at Southwestern at Memphis College in Memphis, Tennessee. Professor Miles teaches in the Huxley College of Environmental Studies at Western Washington University in Bellingham.

WEST KENTUCKY ENVIRONMENTAL EDUCATION CONSORTIUM

. Shaw Blankenship[1] and Lynn M. Hodges[2]

The school systems in west Kentucky have had an interest in environmental education, conservation education, and outdoor education since the early '40s. Monthly use of resource specialists from the Kentucky Department of Fish and Wildlife has been a regular part of many of the schools' activities. The fifth and sixth graders participating in this academic program were also recruited for participation in the summer's Conservation Camp, located on Kentucky Lake. Area teachers have had the opportunity to sharpen their teaching skills through a "Conservation in the Schools" college course and through an "Outdoor Education" residential course held annually at Tennessee Valley Authority's Land Between The Lakes, both sponsored by Murray State University. TVA's development of Land Between The Lakes, complete with residential environmental education facilities, also has contributed to a growing awareness and need for environmental education programs in the western region of Kentucky.

Many systems began to commit their Title III, E.S.E.A., and other funds to development of such programs. Murray City Schools developed a model outdoor laboratory for the region, and the Paducah City School System successfully integrated the environmental education program throughout their schools and published the Environmental Education Objectives and Field Activities curriculum series. Murray State University began one of the first wilderness school approaches, using the "outward bound" stress/challenge technique in Project Apollo. With the hosting of the national conference of the Conservation Education Association by Tennessee Valley Authority, Murray State University, and the Kentucky Department of Education, the regional focus for environmental education began to develop. With the publication of the Kentucky Plan: Guidelines for Environmental Education, which identified specific roles for school systems, universities, civic groups, and governmental organizations, this regional awareness of a need for a coordinated effort, based on regional needs, and combining the unique regional resources of western Kentucky, was solidified. The stage was set for the organization of the West Kentucky Environmental Education Consortium (WKEEC).

In the fall of 1975, eleven school systems in west Kentucky (currently 13) jointly committed their resources to the development of a regional environmental education program that would make use of the unique physical, cultural, and social resources of the region. The WKEEC pooled existent program information, special expertise, and experiences of the participating districts for environmental education. Through their cooperative efforts, a full-time coordinator was hired. The consortium began to implement programs that would not be feasible if only a single system were attempting the effort. The funding potential was much greater than that of a single system, especially when applying for grants or requesting matching funds.

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[2] Environmental/Energy Program, Division of Land and Forest Resources, Tennessee Valley Authority, Norris, TN 37828.

The organization structure of WKEEC allowed for input from many levels of educators ranging from classroom teachers to administrators. A Board of Directors was formed of superintendents from each participating school system to approve programs and activities. The Regional Coordinator implemented the programs and served as a consultant to the schools. A Steering Committee, made up of individuals appointed by each superintendent, functioned as a "think tank" group.

Initial funding for WKEEC was provided by Murray State University and the Tennessee Valley Authority, within the administrative framework of the Kentucky Educational Development Region I. The agreement provided for the employment of a regional coordinator as a Murray State faculty member. TVA and Murray State provided additional staff support and services. A funding formula was developed by participating school systems, consisting of $200 membership fee annually and $.10 per child based on average daily attendance.

The Steering Committee recommended, and the Board of Directors approved, the following four priority areas for the Regional Coordinator and staff:

1. Establishment of a resource center for environmental education.
2. Provision for localized teacher-awareness program.
3. Identification, development, and utilization of significant environmental study sites within the region.
4. Provision for environmental education workshops of a regional nature.

The resource center for environmental education materials, including curriculum guides, books, games, field equipment, and current journals and publications, was established. Murray State provides the actual center space and a graduate student to catalogue and develop indices. Initial holdings were secured through a matching contribution from TVA and WREEC. In subsequent years, Murray State has continued to provide a graduate student and the WKEEC has provided funds for expansion of the resource materials. Regional teachers, university faculty, and students have major access to the materials. Frequently, state and federal agencies use the resources for their program needs.

The localized teacher-awareness objective is met through the unique utilization of an environmental van. TVA loans the environmental van to the coordinator of WKEEC. Murray State contributes a graduate assistant to operate and serve the regional teachers with the traveling collection of resource materials, publications, and aides. WKEEC provides funds for additional materials and aids as recommended by the Steering Committee. The environmental van operator, a graduate student, is selected from the environmental education students at Murray State and is required to have at least two years teaching experience.

Environmental study areas within the region were identified and encompass a broad range of sites. Wilderness areas, such as those existing in TVA's Land Between The Lakes, Kentucky and Tennessee state parks, university-owned sites, and national parks, were identified. Local sites were also identified throughout the region, and include numerous cultural and historical areas. On the individual school campuses, efforts have been made to encourage school site development for use in environmental education programs. All participating systems in WKEEC have a minimum of one developed school site.

Environmental education workshops, both curriculum-focused and activity-focused, have been implemented. Teacher exposure to the Computer Based Resource Units and OBIS materials provides curricular environmental education opportunities. Activity workshops, such as those sponsored by the American Forest Institute's Project Learning Tree and the U.S. Forest Service's Investigating Your Environment, have also been provided. Several regional-specific workshops have been provided on topics such as "Environmental Education Activities for the Classroom" and "Energy Concepts for Environmental Education." A third graduate assistant from Murray State was added this year to coordinate these workshops.

As the four priority objectives were implemented, the interdependent relationship between WKEEC and Murray State became obvious. The formalization of this relationship was to emerge in the form of the Murray State Center for Environmental Education. The Center for Environmental Education adopted the primary objectives of WKEEC and described them in a general term as regional service. Such regional service maintains the original Board of Directors and Steering Committee and is supported in part by the WKEEC annual funding. The Center, however, expanded its overall role in environmental education and in addition to the regional service function identified three new functions:

1. Preservice teacher education.
2. Program development.
3. Research.

Exposure of all teacher candidates, prior to actual employment as teachers, to techniques of environmental education is the major pre-service objective. Such exposure may well include experiences in utilization of the Center's resources and residential experiences at Land Between The Lakes.

Program development has been greatly enhanced by the Center's ability to write grants and proposals for the WKEEC region. Among the most successful results has been the project, Environmental Approaches to Special Education. This project was made possible through monies solicited through the U.S. Office of Education and provided for a national demonstration of this approach on the Murray State campus. Another successful program demonstration has been the American Forest Institute's Project Learning Tree. The AFI and the Kentucky Department of Education identified the Center for Environmental Education as the principal facilitator for teacher training in this program for the state of Kentucky. Similarly, the Center functioned as the facilitator of the organizational meeting of the Southern Regional Environmental Education Council which comprises 13 southern states. This organizational meeting, sponsored by AFI, TVA, and Murray State's Center for Environmental Education, resulted in a formal agreement among these states in relation to environmental education.

The research role of the Center is that of a broker between the University and other groups needing research in environmental education. Testing of materials, design of instrumentation, and overall evaluation of environmental education programs and produces are major research-related tasks. Evaluation of the applicability of a computerized energy simulator and a two-year study of the interpretive efforts at TVA's Land Between The Lakes are current research tasks.

The expansion of the environmental education effort in west Kentucky from a fragmented school system level, to an organized consortium, to a cooperative Center for Environmental Education, has been a process of evolution based on the real needs of the west Kentucky region. The services to the public schools, as well as the expanded benefits to Murray State University, are providing a model for other similar developments throughout the southeast. The success of this effort, and the prospects for its continuation, are attributable to the cooperation between the University and public school participants and their ability to present a unified approach to environmental education in west Kentucky.

LOCAL WATERSHED PROBLEM STUDIES — A CURRICULUM DEVELOPMENT PROGRAM

Wesley F. Halverson[1]

Local Watershed Problem Studies (LWPS) is an environmental education curriculum development program in Wisconsin that employs an intensive teacher-center approach. Participating K-12 teachers receive extensive environmental training, design study units, pilot-teach their units, and disseminate the completed curricula to other teachers.

Program staff train the teachers, edit their study units, evaluate student performance during pilot-teaching, and produce curricula guides containing learning activities from the most effective study units. Case studies are written by school students who do community projects on water quality problems. Exemplary case studies are printed in the curriculum guides. Dissemination occurs at teacher in-service workshops conducted by the trained teachers. LWPS staff publicize the in-service workshops and coordinate scheduling.

Program funding comes from two sources: U.S. Environmental Protection Agency (EPA), and the Elementary and Secondary Education Act, Title IV-C, which is administered by the Wisconsin Department of Public Instruction and Cooperative Educational Service Agency 16 (CESA 16).

The program has brought about new cooperation between members of a large school district consortium (70,000 students), staff of resource planning and management agencies, local members of lake districts, county and city governments, non-government organizations, and private industry. Future plans call for expansion to three more Wisconsin watersheds, new concept planning conferences, changing curriculum development emphasis from control of eutrophication to control of basic and hazardous substances and environmental health.

The Water Quality Problem

When Congress amended the Federal Water Pollution Act in 1972 (PL 92-500), state and local agencies began planning water quality improvement programs which redirect abatement efforts against the sources of pollution rather than against the effects of pollution. Congress reaffirmed most of its 1972 commitment against pollution of the nation's rivers and lakes when it adopted the Clean Water Act of 1977 (PL 95-217). The federal government still expects water quality improvement by July 1, 1983 that will allow fish, shellfish, and wildlife propogation and encourage human recreation on and in navigable surface waters. Another and more ambitious goal is to eliminate any discharge of pollutants into the nation's navigable waters by 1985.

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The EPA estimates that only 50 percent of all water pollution comes from point sources (industrial and municipal discharges), and the other half comes in surface water runoff from farms, city streets, strip mines, construction activities, or from air pollution fallout. Called nonpoint sources, their diffuse nature often requires specialized control technology and local land use laws that enforce better management practices. The national water quality goals are not likely to be met without substantial control of nonpoint sources of pollution.

Water pollution abatement principles underlying the Clean Water Act become comprehensible and rational _after_ public awareness and learning develop around the environmental concepts supporting the principles. The public will know why city streets need sweeping more often and more efficiently, requiring parking restrictions and expensive vacuum sweepers, after they learn that storm sewers carry large quantities of sediment, nutrients, and toxic substances into nearby water bodies.

Adequate public action will not occur if motivated solely by awareness and knowledge. Clean water must have some personal value and individuals must accept their share of the pollution abatement costs and willingly relinquish some individual rights in favor of public benefit. Within the affective domain, public learning requires crystallization of human attitudes which are predicated on social ethics and morality. An emotional appeal for action against water pollution can help change public attitudes, if coupled with rationalization based on cognitive understanding. One is wasted without the other.

Other national issues have social, cultural, and economic implications which could compete with water pollution abatement. Energy and food production are two notable examples. The nation needs energy, but the unavoidable extraction and conversion activities have high water pollution potentials. The world needs more food, but cropping marginal land and using heavy chemical application could reduce water quality. The issues are also interdependent because both food and energy production need high water quality.

Environmental management decisions have entered the legislative process where tradeoffs are made between natural resources by political representatives of the people. Some decisions go to the public directly, most often at the local level. An environmentally educated public would make better tradeoff decisions than a public unaware of the potential ramifications of their decisions.

The LWPS Program

Natural resource management is an important government responsibility and individual citizens share that responsibility. Schools can contribute to better public participation by helping young people prepare themselves for the decision-making process. The LWPS program has two goals to facilitate student learning: 1) to assist teachers who provide educational experiences that cause school-age citizens to acquire knowledge, skills and attitudes that enable them to participate in rational environmental management decisions relevant to land use activities that affect water quality (Figure 1); and 2) to develop student concern for community resources and expand their knowledge of local water quality issues by increasing their participation in community problem solving (Figure 2).

The EPA has sponsored extensive water quality planning programs across the nation and extensive research projects that further describe regional water quality problems and potential solutions. The LWPS program began under an EPA-funded research project at the University of Wisconsin-Water Resources Center, the Washington County Project.

The Washington County Project is an interdisciplinary study and demonstration of effective methods for controlling water pollution from dispersed runoff sources. The LWPS program comes under the information and education program objectives printed in Work Plan No. 905/9-77-001 and Section 108 of PL 92-500. The purpose is to modify citizen attitudes and behavior on a long-term basis so that erosion control can be increased substantially and sediment pollution loads to surface waters reduced.

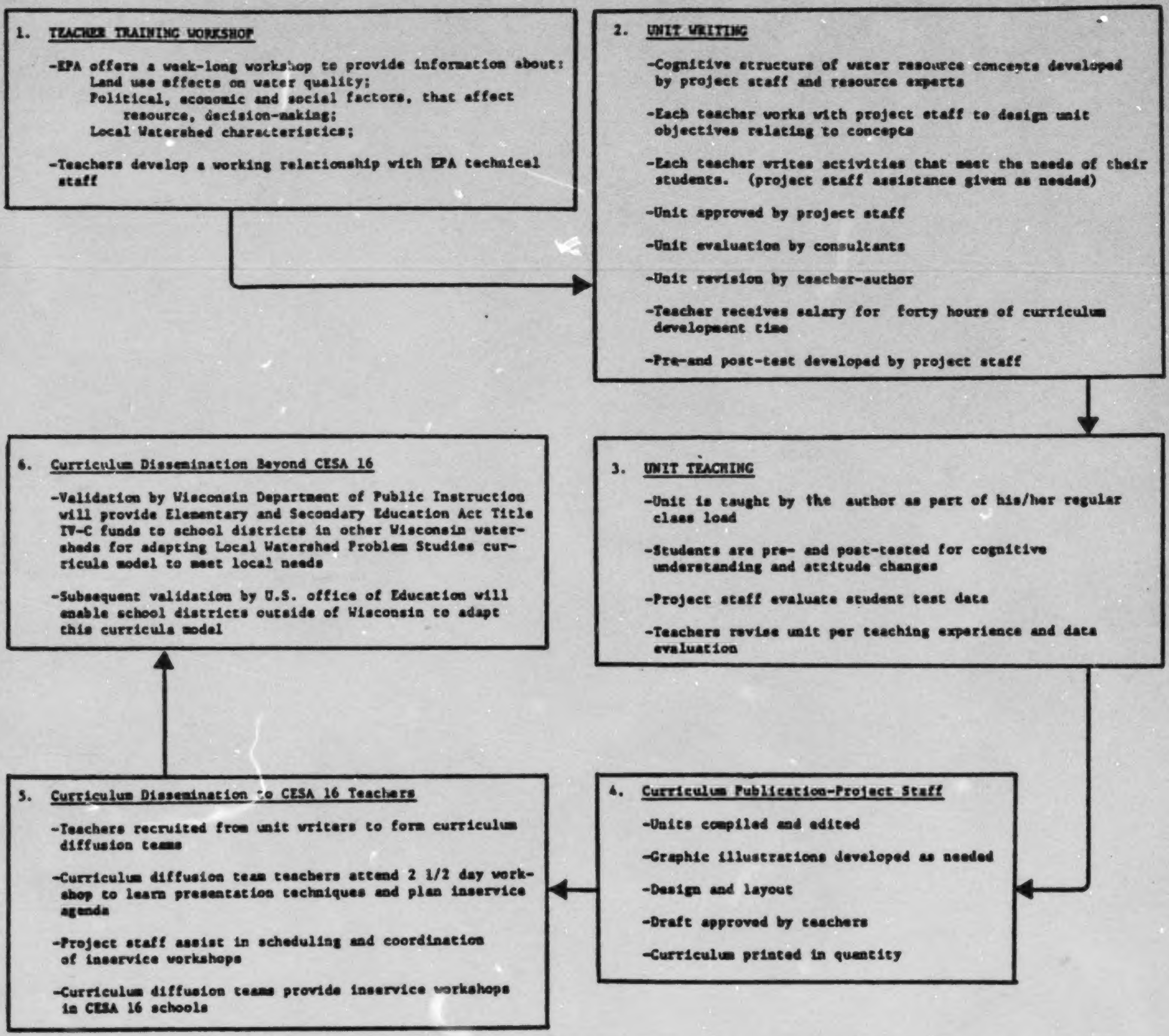
A teacher and school administration constituency was identified in Washington County and the LWPS program was planned with them. A consortium of six public and six private school districts was formed, and a planning grant proposal was generated and submitted to the Wisconsin Department of Public Instruction for support from the Federal Elementary and Secondary Education Act Title IV-C. The grant was approved and, midway through year one, a second proposal was submitted and the consortium grew to 23 school districts and expanded into the adjacent county. The Waukesha County schools bracket the western suburbs of Milwaukee, where the population density is much higher than the semi-rural Washington County area north of Milwaukee.

CESA 16 acts as the administrative agent of the Title IV-C funds and school district administrators decide consortium membership. A steering committee was appointed by the district administrators and serves the program policy, decision-making role. CESA 16 hires the participating teachers, a local program director, and a part-time writer/editor. The teachers are not paid during training, but earn a salary when writing their teaching units and giving in-service programs to other teachers.

What Has Been Learned About the Program

The LWPS program is two years old and still developing. Some program elements require more time to develop that anticipated. The elementary teachers generally wrote more complete units than the secondary teachers. Consequently, the secondary units demand more staff time for revisions and additions. The curriculum guides need more interdisciplinary units (teachers cooperating to teach the same students)

Figure 1 Local Watershed Problem Studies; School Curriculum Development Model*



1. TEACHER TRAINING WORKSHOP

-EPA offers a week-long workshop to provide information about:
Land use effects on water quality;
Political, economic and social factors, that affect resource, decision-making;
Local Watershed characteristics;

-Teachers develop a working relationship with EPA technical staff

2. UNIT WRITING

-Cognitive structure of water resource concepts developed by project staff and resource experts

-Each teacher works with project staff to design unit objectives relating to concepts

-Each teacher writes activities that meet the needs of their students. (project staff assistance given as needed)

-Unit approved by project staff

-Unit evaluation by consultants

-Unit revision by teacher-author

-Teacher receives salary for forty hours of curriculum development time

-Pre-and post-test developed by project staff

3. UNIT TEACHING

-Unit is taught by the author as part of his/her regular class load

-Students are pre- and post-tested for cognitive understanding and attitude changes

-Project staff evaluate student test data

-Teachers revise unit per teaching experience and data evaluation

4. Curriculum Publication-Project Staff

-Units compiled and edited

-Graphic illustrations developed as needed

-Design and layout

-Draft approved by teachers

-Curriculum printed in quantity

5. Curriculum Dissemination to CESA 16 Teachers

-Teachers recruited from unit writers to form curriculum diffusion teams

-Curriculum diffusion team teachers attend 2 1/2 day workshop to learn presentation techniques and plan inservice agenda

-Project staff assist in scheduling and coordination of inservice workshops

-Curriculum diffusion teams provide inservice workshops in CESA 16 schools

6. Curriculum Dissemination Beyond CESA 16

-Validation by Wisconsin Department of Public Instruction will provide Elementary and Secondary Education Act Title IV-C funds to school districts in other Wisconsin watersheds for adapting Local Watershed Problem Studies curricula model to meet local needs

-Subsequent validation by U.S. office of Education will enable school districts outside of Wisconsin to adapt this curricula model

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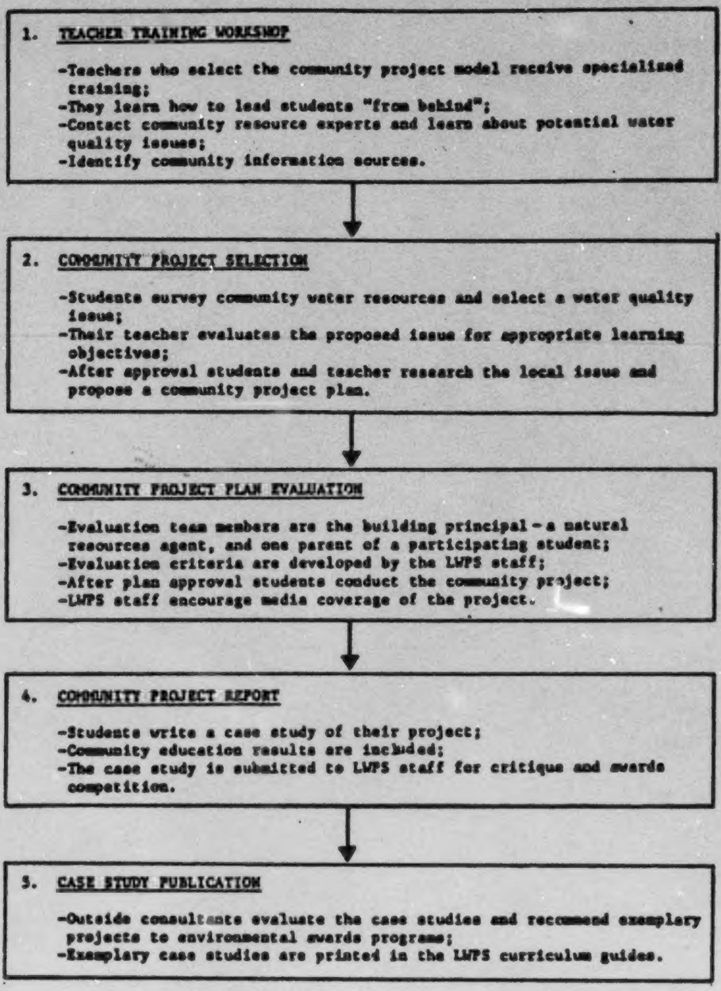
*Wes Halverson, Washington County Project, University of Wisconsin, Water Resources Center

Figure 2. Local Watershed Problem Studies; Student Community Project Model*



1. TEACHER TRAINING WORKSHOP

-Teachers who select the community project model receive specialized training;
-They learn how to lead students "from behind";
-Contact community resource experts and learn about potential water quality issues;
-Identify community information sources.

2. COMMUNITY PROJECT SELECTION

-Students survey community water resources and select a water quality issue;
-Their teacher evaluates the proposed issue for appropriate learning objectives;
-After approval students and teacher research the local issue and propose a community project plan.

3. COMMUNITY PROJECT PLAN EVALUATION

-Evaluation team members are the building principal - a natural resources agent, and one parent of a participating student;
-Evaluation criteria are developed by the LWPS staff;
-After plan approval students conduct the community project;
-LWPS staff encourage media coverage of the project.

4. COMMUNITY PROJECT REPORT

-Students write a case study of their project;
-Community education results are included;
-The case study is submitted to LWPS staff for critique and awards competition.

5. CASE STUDY PUBLICATION

-Outside consultants evaluate the case studies and recommend exemplary projects to environmental awards programs;
-Exemplary case studies are printed in the LWPS curriculum guides.

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*Wes Halverson, Washington County Project, University of Wisconsin, Water Resources Center and units written for high school subjects outside the traditional science and social studies fields. Teachers are reluctant to undertake a community project (under goal two) until they have taught a unit on the subject. Teachers usually want more training and preparation time before they start writing a unit. Program improvement would involve more intensive teacher training and consist of six sequential steps:

1. A fall seminar (University taught and for graduate credit) on important environmental issues from the local, state and federal perspective;

2. A spring seminar on proven and innovative teaching methods for environmental education and how to write good teaching units and establish the inquiry method of environmental studies;

3. Concept planning conferences--invite participation from both the public and private sectors of society;

4. Summer workshop--intensive training on the concepts developed at the conferences;

5. Writing and pilot-teaching the units;

6. LWPS curriculum dissemination activities at the local, state and regional levels.

INTERDISCIPLINARY ENVIRONMENTAL STUDIES PROGRAMS AT A SMALL LIBERAL ARTS COLLEGE

Samuel S. Harrison[1]

Program Evolution

When Allegheny College established the Aquatic Environments (AE) major in 1971, our initial goal was to prepare students for jobs immediately upon graduation. We soon learned, however, that a strictly "terminal degree" orientation was impractical because many employers preferred a masters degree and many of our students were graduate degree oriented. As a result, we broadened our scope so that those who wished to could go on to graduate study.

In response to student interest, a second program evolved which had a greater social science emphasis. This program, Environmental Resource Management (ERM), enabled students preparing for graduate work in land-use planning, environmental law, public resource administration, etc., to obtain a good environmental science program to support their social science skills.

Enrollment

Enrollment in the programs exceeded our expectations (Figure 1). Despite concern that we would steal majors from established science programs, enrollment in many biology and geology courses has actually increased due to the influx of environmental science majors.

Entering students can be subdivided into four categories: (1) park naturalists, environmental interpreters, environmental educators, (2) scientists who want to work on environmental problems, (3) environmentalists who feel compelled to try to improve things, and (4) journalists who want to become "interpreters" of science for the public.

To develop an interdisciplinary problem-solving approach, both natural science and social science courses are included in our curriculum. We offer team taught freshman-, sophomore-, and junior-level environmental courses. Also, our majors are exposed to a variety of approaches and curricular backgrounds throughout their programs. For instance, in a hydrogeology course, AE and ERM majors are working side by side with geologists; in ecology they must share a niche with biologists; in an economics seminar they work in teams of students from several different departments. This is important. Had we created a complete suite of new courses exclusively for our majors, they would have been sheltered from this constant exposure to different approaches and ways of thinking. Perhaps there is something to be said for having to work with limited institutional resources!

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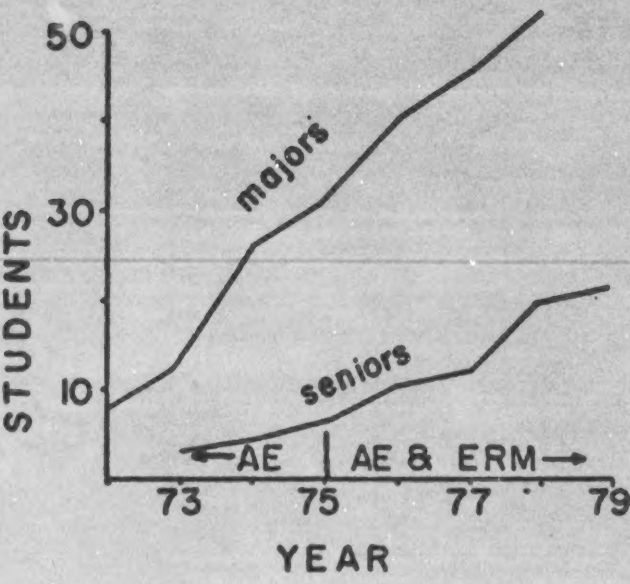

Figure 1.--Number of students enrolled in environmental science majors at Allegheny College. Jump in enrollment after 1975 is due in part to the addition of the environmental resource management major (ERM) to the aquatic environments (AE) program begun in 1972.

Another of our goals is that of trying to overcome the attitude exemplified by many practicing professionals that professional stature is eroded by working with local people on local problems. We encourage students to become involved in often unglamorous local problems, and particularly we impress upon them the importance of communicating their knowledge to the general public. We reinforce this by requiring them to write technical papers for a lay audience.

We also emphasize improving the students' ability to communicate. Courses in writing are recommended, and in many cases, required. Even some of the lab science courses require term papers. Each student makes several seminar presentations and all students must write a senior research project.

Another goal is to provide students with a solid foundation in the basic sciences. It comes as a shock to many students to learn that environmental science is not a soft path through the sciences. It is still necessary to acquire basic skills in the "old" sciences, e.g., chemistry, math, and, in many cases, statistics and physics, in order to become one of the "new" scientists.

Although curricular breadth is desirable, if not necessary, many graduate programs require depth in a traditional discipline. If there is a weak spot in environmental programs, this is it. Lots of breadth but no depth.

Our solution to this problem is to advise each student to complete a minor in conjunction with the interdisciplinary major. The minor, combined with the courses is these disciplines already required in their major, brings them close to a traditional major in addition to their environmental science major. For the AE students, the minor, and the basic chemistry, calculus, and physics courses, make them acceptable to traditional graduate programs. We seem to be close to meeting the goals of breadth and depth.

Curriculum

Both the AE and ERM majors work from a core of natural science, social science, and interdisciplinary environmental science requirements (Table 1). Students intending to become scientists (AE majors) will add advanced courses in biology (limnology, stream ecology), physics, and calculus plus a minor in the area of science most closely aligned with their professional goals. Those wishing to use science in dealing with social problems (ERM majors) build on the core foundation with advanced economics and political science courses, computer programming, and a minor in the social sciences or journalism.

About one-fourth of our majors complete an internship with local businesses or government and public agencies (e.g., county planning commission, regional environmental learning center, groundwater consulting firm, state environmental regulatory agency). These experiences not only provide exposure to potential careers and strengthening of job skills, but they also serve to emphasize the interdisciplinary and non-simplistic nature of environmental problems.

Special emphasis is placed on field experience. In four of the required courses, more than half the labs consist of field work. In addition, most senior research projects include field work.

By far the most challenging part of each undergraduate's academic career is his/her senior research project. Students spend six to twelve months conducting independent research in their particular areas of interest. Each project entails problem design, sampling, collection and analysis of data, and preparation of a written thesis. This serves as a capstone to each student's undergraduate program. Examples of projects include:

-Impact of a flood control dam on the water quality of a trout stream;

-Land use analysis of East Mead Township;

-Water quality near the Meadville landfill;

-Forest Management plan for Bousson woods.

Table 1. Curricula for Environmental Science Programs at Allegheny College

Aquatic Environments ↘

Environmental Resource Management ↙

Core Requirements

- Natural Science
  - -Introductory Biology
  - -Physical Geology
  - -General Ecology
  - -Geomorphology
  - -Hydrogeology
  - -Chemistry
- Social Science
  - -Microeconomics
  - -American National Government and Politics
  - -Intergovernmental Relations in the U.S.
  - -Public Finance
  - -Statistics
- Interdisciplinary
  - -Introduction to Environmental Science
  - -Junior Seminar in Environmental Science

↙ ↘

-Differential and Integral Calculus
-Either Limnology or Stream Ecology
-College Physics
-Senior Research Project

-Introduction to Computer Science
-One of the following:
  Public Service Program Management and Evaluation Techniques
  or Economics of Publicly Provided Goods and Services
-One of the following:
  Population Dynamics,
  Environmental Psychology,
  Public Administration,
  Urban Government and Politics,
  or Environmental Law
-Senior Research Project

Problems and Weaknesses

Due to the limited resources of a small institution, our program has no departmental status, no rooms, no staff of its own, and very little equipment. We depend on other departments to share their facilities and staff. Thus far, sharing space and equipment has been no problem. These departments realize that our added use bolsters justification for equipment and faculty. The necessity of sharing with other departments also goes a long way toward fostering an interdisciplinary environment.

Staffing is the biggest problem. All faculty involved in the environmental program "belong" to other departments. Our needs have necessitated adding one position each to biology and geology. Persons hired to fill these slots had to meet the expectations of both the "home" department and the environmental science group. Untenured faculty members sometimes find these positions somewhat awkward, because on the one hand they were hired to work in the environmental program yet they are evaluated and recommended for tenure and promotion largely by their "home" department. For instance, should a young ecologist continue to pursue a narrow research interest developed in graduate school in order to produce the type of research his/her home department expects of a person who aspires to gain tenure, or should he/she diversify in response to the much broader, often interdisciplinary, research interests of the environmental science students with whom he is working? In an extreme instance, a willing faculty member may be discouraged from participating in the program at all simply because his/her department feels he/she should tend the home fires. A partial solution we've adopted is to have the faculty member serving as director of the environmental science program participate in annual evaluations of all faculty participants.

Another problem with this type of program is that it is like a toddler that never grows up. Who is to say what company X or graduate department Y expects of our graduates? What will the curriculum be like in five years with rapid changes in the energy field? How can the delicate ratio of breadth and depth be kept in balance? A high, sustained energy-level is required.

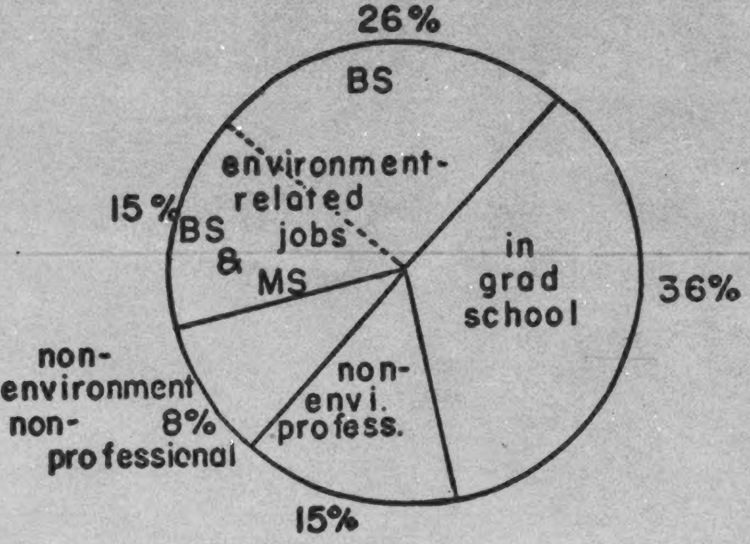

Figure 2.--Thirty-six percent of the Allegheny environmental science graduates are presently enrolled in graduate school. Of the 41 percent now employed as professionals in the environmental field, 26 percent have only a B.S. degree. Twenty-three percent are either employed as professionals in a field unrelated to the environment or are holding temporary non-professional jobs while seeking positions related to their major.

Program Strengths

Many students are attracted to the program's interdisciplinary curriculum. Some students chose our program because they want to study more than one science. Also, students undecided on whether to major in biology, geology, or environmental science can carefully structure a program which will enable them to explore all of these areas before selecting a major.

Another plus from the student perspective is that our program enables them to pursue a wide array of career options. After deciding on their minor and senior research project in their junior year, they can pursue options as diverse as environmental law, resource management, or aquatic entomology. We pride ourselves in this individual "tuning" of the program for each student.

TABLE 2

Graduate Schools and Programs in Which Allegheny Environmental Science Majors Have Enrolled

Grad School Attended	Graduate Program or Department	Allegheny Major (minor)
University of Florida	Environmental Engineering Sciences	Aquatic Environments
University of Michigan	Water Resources	Aquatic Environments
University of Cincinnati	Geology	Aquatic Environments (English)
....	....	....
Montana State	Geology	Aquatic Environments (Biology)(Geology)
Hershey Medical School	Biochemistry	
....	....	....
Penn State	Environmental Pollution Control (through Dept. of Civil Engineering	Geology
University of Michigan	Water Resource Science Environmental Science	Aquatic Environments and Biology
University of Oregon	Entomology	Aquatic Environments (Biology)
University of Pennsylvania	Environmental Planning	Geology
University of Michigan	Toxicology	Aquatic Environments
Virginia Polytechnic Institute	Biology	Aquatic Environments (Bioloty)
University of Arizona	Biology	Aquatic Environments and Biology (Chemistry and Geology)
SUNY College Environmental Sciences and Forestry	Resource Management	Aquatic Environments (Biology)
University of Florida	Environmental Engineering	Aquatic Environments (Biology)
University of Idaho	Hydrogeology	Aquatic Environments (Geology)
University of Maine-Orono	Resource Utilization	Aquatic Environments
University of Pittsburgh	Graduate School of Business	Aquatic Environments and Economics
Brown University	Environmental Engineering	Aquatic Environments (Chemistry)
University of Buffalo	Environmental Science	Environmental Resource Management (Biology)
University of Idaho	Biology	Aquatic Environments (Biology)
University of Virginia	Environmental Planning	Environmental Resource Management (Geology)
Duke	Environmental Resource Management	Environmental Resource Management
University of Michigan	Forestry	Environmental Resource Management
Duke	Environmental Resource Management	Aquatic Environments (Biology)

The perceived strengths of a program like ours from the perspective of the college are many. We provide another option for the high percentage of incoming freshmen intending to major in the sciences. Our programs attract 15 to 25 students per year to the college. We are a low-expense program because most of our staff, equipment, and facilities are shared with other departments. Those courses that have been instituted largely because of our programs provide electives for advanced students in other majors.

Finally, the college may look upon us with some favor because we are interdisciplinary. There is a lot of talk on our campus about the need to integrate the pieces of the liberal arts education via some type of interdisciplinary approach. We have a head start.

The Bottom Line--Does the Program Work?

Sixty percent of our 70-plus graduates have pursued graduate work in areas related to their major (Figure 2). This should dispel fears that students with interdisciplinary backgrounds cannot enter graduate programs. In order to help graduate schools assess the ability of our graduates, we send a version of Table 2 with each letter of recommendation.

A high percentage of our graduates (about one-third) have obtained professional jobs in the environmental field with their bachelors degrees. We advise them that they need to produce a good resume and spend up to six months diligently seeking the job they want. After working for a couple of years, some return to school for masters degrees when they have focused on an area they wish to pursue.

FORMING AND SUPPORTING CONSORTIA: A TVA APPROACH TO ENVIRONMENTAL EDUCATION

Lynn Michael Hodges[1]

The National Environmental Policy Act (PL 91-190) of 1969 provides a common charge to the federal sector with respect to environmental education:

> Sec. 101. (a). The Congress...declares that it is the continuing policy of the Federal Government, in cooperation with state and local governments, and other concerned public and private organizations, to use all practical means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

For the purpose of this paper, a consortium is an organization structure that facilitates achievement of a common set of objectives agreed upon by its participants. A consortium provides a formal recognition of the importance of specific programs, and is a useful structure for environmental education. Programs generating from an environmental education consortium have two specific audiences: the in-school population--the students; and the out-of-school population--the citizens in general. Participants in such consortia frequently include institutions of higher education, public school systems, governmental and nongovernmental organizations. A consortium organization is particularly appropriate when examined in light of several points raised by the National Environmental Policy Act. Consider three points raised by NEPA.

First, "cooperation with state and local governments" is significant because education ranks high among the states' rights issues. Coordination and cooperation with state and local governments is a federal priority. State Departments of Education, local governments, and public school systems are the ultimate bases for identification of needs and priorities, and have the mandated responsibility for program implementation.

The second, "to use all practical means and measures," dictates a service role which is further specified by the phrase "including financial and technical assistance." This gives authority to spend federal funds in support of environmental education programs. "Technical support" is subject to interpretation; however, staff assistance and consultation, provision of materials, and provision of the agencies' lands and facilities are typically considered "technical support."

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The third deals with the manner or intent of such "practical measures." Specifically, "to create and maintain conditions under which man and nature can exist in productive harmony" implies that the "measures" should be directed at developing a continuing effort, not one that is short-lived or insignificant. As with most education, this level mandates planning and careful development of themes that are applicable to both current and future concerns. The environmental education program will, in this manner, be maintained.

These three points establish parameters that are of significance to federal agencies working with environmental education. The environmental education consortia developed and supported by Tennessee Valley Authority (TVA) have been effective mechanisms for dealing with the points raised by the National Environmental Policy Act.

The environmental education consortium provides the opportunity to work closely with the local sector and provides a common ground for state and federal input. It is a delivery system for federal resources. Financial and technical assistance can be directed at a single organization with assurance that the assistance will benefit the total participants in the consortium. Finally, by contributing to a structure that is also reinforced by state and local support, a degree of longevity and continuity is assured. The cooperative relationship among the participants is the key to this longevity. Any program totally built on federal support, financial or technical, is subject to rapid dissolution when federal funds are reduced or withdrawn. The past two decades are filled with examples of how such federal input, without appropriate state or local support, has failed to create programs that continue beyond the federal funding period.

There are two key roles for the federal agency that wants to employ consortia development as a strategy. First, in the initial development, the agency can act as a catalyst to bring appropriate separate entities together. It can reinforce the position of a consortium by promotion with the State Department of Education and other regulatory or supportive organizations. It can also provide funds for the establishment of the consortium. The second role emerges after the consortium is formed. The consortium should be used as a delivery system. Programs, materials, and developmental projects should provide a regular flow of products through the system, to both the formal and nonformal audiences.

These products should be directed at meeting the needs of the consortium participants and may well meet specific environmental education needs of the agency. The role of the agency, however, should remain supportive, not overly directive. For example, the agency can provide financial input for the support of a full-time coordinator for the consortium, for the purchase or development of environmental education materials, and for specialized training efforts. As the service provided to the participants is the final measure of the consortium, federal funds should contribute directly to that goal. The agency should not impose its own environmental bias on the participant, but rather provide a broad base of support for environmental education directed toward local needs and implemented by local participants.

Three examples of consortium development are visible in the efforts of the Tennessee Valley Authority's environmental education program. In 1972, TVA provided planning assistance to a 13-county area in northwest Alabama. Funding was subsequently provided to employ a full-time coordinator for environmental education to serve the local schools in the area. The members of the Bear Creek Watershed Environmental Education Consortium created a funding formula whereby each school system would contribute annually to the overall budget of the consortium. This strong base of local support has been successful in working with local governments, and state and federal agencies. As of 1979, this consortium has been self-supportive for six years.

A second example involves participants from higher education. The North Mississippi Environmental Education Consortium consists of the University of Mississippi, Mississippi State University, Itawamba Junior College, and Northeast Mississippi Junior College. The use and environmental significance of the Tennessee-Tombigbee Waterway for environmental education is a major focus of the consortium. TVA is providing financial and technical assistance to the consortium for employment of a full-time coordinator. A university-based Center for Environmental Education will function to provide teacher training, regional service to public schools, special program development, and research in environmental education.

The third example merges the previous two approaches to formation of a consortium. The West Kentucky Environmental Education Consortium (WKEEC) is a combination of public schools and university. Early in its history, WKEEC was a consortium of public schools. As their program developed, cooperation with Murray State University increased. Eventually, the two merged. A Center for Environmental Education was formed at Murray State University, with the WKEEC maintaining its board of superintendents for direction. Although the university still provides academic training and program development, jointly the two have been able to provide higher quality and more diverse services. TVA has provided financial assistance for materials and employment of a full-time coordinator, and technical assistance for workshops and special programs. The success of the Murray State/WKEEC program has prompted TVA to initiate similar assistance with other public schools and universities. The ultimate product will be a network of 17 such centers in the seven-state TVA region.

Consortia provide unique opportunities for federal input into environmental education. They provide delivery systems for technical and financial assistance while providing for local focus and management of programs.

INTERDISCIPLINARY ENVIRONMENTAL STUDIES: AN ALTERNATIVE APPROACH FOR EDUCATING ELEMENTARY TEACHER CANDIDATES

Florence Krall and Ladd Holt[1]

This paper describes our attempts to provide a "deep" curriculum for elementary education majors enrolled in science and social studies methods, and to analyze the effects of this educational experience upon the curriculum constructs of the participants. The study was patterned after the work of Bussis, Chittenden, and Amarel (1976), who adapted Kelly's theory of personal constructs (Bannister and Fransella 1971) to analyze teachers' perceptions of curriculum.

Bussis, et al., employ a linguistic metaphor to distinguish the difference between a "surface" and "deep" curriculum. Curriculum is like sentence structure. In the former case, curriculum represents an organization and sequencing of "words," i.e., activities directed primarily at the acquisition of prescribed and predetermined knowledge and skills. In the latter case, the curriculum carries deep personal meaning for the student that goes beyond the surface structure (Bussis 1976). It was our assumption that elementary teacher candidates, as well as elementary students, can benefit from a "deep" curriculum with integrated, field-based studies that allow "access" to a multitude of possibilities for organizing and reorganizing individual perspectives (Hawkins 1966).

Purposes and Investigations of Interdisciplinary Studies

Our intent in Interdisciplinary Studies was to involve students in in-depth studies that would enhance personal understandings. Furthermore, we sought to place students in an active role, forcing them to determine processes and outcomes, negotiate and work with others, and throughout, construct a personal interpretation of the curriculum. Our expectation was that after experiencing a curriculum designed to enhance personal meanings, students would themselves view curriculum in more comprehensive terms.

Common themes of the interrelatedness of life and the nature of communities were used to plan a series of environmental experiences that stressed basic ecological principles: temporal and spatial limiting factors, energy transformations, renewable and nonrenewable resources, the cyclic nature of natural systems (Daubenmire 1968). The ecological principles for natural communities were used as analogues for human communities in our discussions of human problems and social interrelatedness. From the first day of class to the last, we encouraged students to take active roles. Beginning with more structured inquiry activities, we increased student responsibility as they grew in confidence. During the last activity, they determined totally the method of study and interpretation. The following key activities illustrate the focus on comprehensive priorities and the progression toward more personal determination.

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Create A Scene. As a beginning get-acquainted session, students were asked to create a rubbing or collage that expressed their relationship to the world from natural pigments or materials found on campus around the education building. As the students shared their feelings and ideas, we clarified and reinforced their personal interpretations.

Pond Community. Students studied a small, eutrophic pond, a rich ecosystem with classical examples of recycling of resources, energy transformations, and population dynamics. Our basic equipment for investigating the pond was supplemented by student innovations. Students were asked to describe the pond in terms of its physical resources, producers, consumers, and decomposers, and to identify adaptations for life in the pond. Discussion centered on the meaning of adaptations, the differences between human and animal adaptations, the difference between dependence and independence, the importance of diversity, the role of man in production and consumption.

Waste and Values. The sanitary landfill was the site of a deductive investigation. Students were to deduce from data gathered on wastes the values held by the community. An afternoon was spent interviewing city employees about solid waste disposal; viewing garbage trucks roll in and out, caterpillars covering and moving wastes, thousands of gulls feeding; and taking notes on discarded items and impressions. Classroom activities on values followed. First, a values continuum was created, starting with values deduced from observing the wastes of the community and arriving at opposite values, e.g., dependent--self-reliant (Meux 1971). Second, students dealt with a moral dilemma encountered on the field trip when a student killed an injured California gull, the state bird protected by law. The debate on this issue spilled over into world suffering and the moral obligation to relieve suffering. The latter activity, unplanned but highly beneficial because of its "nearness" to the students, demonstrated the need to deal with relevant issues in the curriculum.

Community Consumption. Having dealt with the "wastes" of the community, we next looked at consumption in the community. Students chose four shopping centers and their contiguous neighborhoods in economically diverse sections of the city and conducted interviews to ascertain attitudes toward consumption. In discussions, students compared the economic stratification of the community with the stratification of organisms in the pond.

Pond Succession. During the last class period, we returned to the pond to witness the biological succession that had occurred since our last visit and to hypothesize about the future development of the human community.

Evaluation of Student Learning

Our interest was not in the students' learning of facts or even concepts, but in the degree to which they acquired a more comprehensive understanding of science and social studies curriculum. The measures used were more subjective than objective, more suggestive than definitive. Three methods of assessment were used: (1) curriculum constructs, a pre- and post-instrument to determine curricular priorities, (2) a self-evaluation of learning, and (3) growth toward goals, a self-report instrument.

Curriculum Constructs

A pre- and post-instrument adapted from the works of Bussis, et al., was used to identify changes in students' understandings of curriculum (Bussis 1976). The instrument consisted of two written responses. First, students were asked to develop a scenario describing a typical day in their future classroom during science and social studies. We requested that students be as specific as they could about the content being studied, the materials being used, and the teaching method. Second, we asked students to provide a rationale for the lessons they had described. Responses to both questions were analyzed to code comprehensive-, middle-, or narrow-range curriculum priorities. Narrow priorities focused upon the learning of specific facts and concepts, middle upon students learning to solve teacher-identified problems, and comprehensive on students becoming independent investigators using resources of the world to increase their understanding.

Each of the two instructors coded the written responses independently and then compared results. We had 75 percent agreement and 25 percent disagreement on the initial coding. We then discussed the eleven resources where disagreement existed and reached consensus on the predominant priority. The number of coded priorities for the pre and post tests in each category are shown in Table 1.

TABLE 1

Numbers of Coded Priorities on Pre and Post Tests

	Pre test N	Post test N
Narrow	2	0
Middle-Range	13	6
Comprehensive	5	17
Totals	20	23

Substantial movement toward comprehensive priorities was shown: from five students on the pretest to 17 on the posttest. The major change between pre- and post-test was from narrow and middle-range priorities on the pretest to middle-range and comprehensive priorities on the posttest.

Growth Toward Goals

At the completion of the course, students were asked to rate themselves on changes they had experienced in terms of the broad aims of the course. A sixteen-item Likert scale of 1 to 5 was devised which asked students to rate the changes they had experienced either toward or away from each goal. Students reported growth toward the goals on all sixteen items. Items in which the most movement was reported included the ability to act spontaneously or be free to express personal feelings or ideas, the ability to comprehend interrelationships in the natural world, the ability to see the beauty in the natural world, and the ability to be open and receptive to new things.

Self-Evaluation of Learning

One of the questions on the final take-home test asked students to evaluate their own learning in the course. While the responses must be understood in terms of the test context (that is, students may have felt compelled to give positive feedback to instructors), the themes that emerged are of interest.

The most consistent theme was that of personal and social knowledge; that is, becoming aware of personal and interpersonal values, roles, and perspectives. Closely related to this was increased motivation to study natural and social phenomena in depth. Students viewed this as a new and personal realm opened to them. Several of the students reported a dramatic change in their understanding and appreciation of the beauty and complexity of the natural world. The pond became not just a pond but a community with interrelatedness and unity. Many commented on their new-found appreciation of the personal pleasure derived from direct encounters with the natural world.

Conclusions

The results provide support for the teaching of method courses for elementary teachers in science and social studies that focus upon students learning about the social and physical world as they study how to teach children. The students moved from seeing science and social studies taught as separate entities for the acquisition of skills and knowledge toward a view acknowledging the benefit from integrating diverse areas of learning. In terms of curricular understandings, more emphasis was placed upon allowing students to develop and carry out their own purposes and grow in knowledge of self and others.

The students in this study did not intially understand how to study the environments in which they lived. When they did begin to encounter the richness of the real world, they saw the task of helping children come to understand the world in a more comprehensive way. This case study suggests that serious attention needs to be given by environmental educators to the study of teacher education.

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THE INSTRUCTIONAL RESOURCES CENTER: A SYSTEMATIC METHOD TO DISSEMINATE ENVIRONMENTAL EDUCATION INFORMATION

Bernard J. Lukco[1]

Environmental education in the '70s has been primarily concerned with assisting the general population to become more aware of conservation needs, energy limitations, pollution control problems, and the emerging social dilemma of equitable allocation of resources. Environmental education in the '80s will demand a continuation of this awareness effort. This decade will also require environmental educators to communicate more effectively by organizing programs to systematically provide information to the citizenry to facilitate quality-of-life choices and decisions, based on carefully assimilated data. Information dissemination, therefore, becomes increasingly more important to the many publics that environmental education serves.

Cooperation is required of all institutions with responsibility for gathering and transmitting information, especially education and training organizations, government agencies, and environmentally-related interest groups. A model program developed by the U.S. Environmental Protection Agency (USEPA) to support the decision-making requirements of institutions which promote environmental goals serves as a focus for this discussion.

USEPA's programs are directed and influenced by prolific legislation mandated by Congress. Consistent with the many provisions of USEPA legislation, there is now and will continue to be a need for trained and qualified personnel in all areas of pollution control, and an assurance that future personnel can deal with complex environmental problems. Qualified professionals and technicians are required for the many consulting firms, for federal, state and municipal agencies, and for academic communities involved with pollution control.

To fulfill these educational and training requirements, USEPA has organized the National Training and Operational Technology Center (NTOTC). NTOTC has the responsibility for planning, developing, conducting, and evaluating USEPA's water pollution control training and education program. As an instructional resource, its purpose is to help regions, states, local governments, and educational institutions to become knowledgeable about USEPA's goals, regulations, strategies, as well as the implications of USEPA programs which affect virtually everyone.

Activities encompass three categories: (1) instruction; (2) course development; and (3) information management.

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Instruction

NTOTC offers a variety of training courses in water quality control. Such courses are taught at many locations, but most are presented at the Environmental Research Center in Cincinnati, Ohio. A current project will expand this effort to enable more environmental personnel to receive specialized instruction. Area training centers will soon act as satellites to the NTOTC program, offering similar courses and instructional support. Select universities with broad pollution control curricula will act as area training centers within a region. As a result, more pollution control personnel will have access to needed specialized training.

Since 1971, the NTOTC professional staff of chemists, biologists, and engineers has presented nearly 350 courses to more than 8000 students. Courses are offered throughout the year, and are designed to help participants understand current pollution control techniques and procedures. As USEPA regulations and policies are implemented, based in large part on USEPA research, courses are offered by NTOTC staff to upgrade knowledge and develop specific skills or procedures.

Some courses are conducted at wastewater treatment plants, enabling USEPA to work directly with plant personnel to improve treatment plant effluent. While working on site at treatment plants, staff can diagnose and discuss particular problems and can provide information on design and operation to many technicians within the local region.

Courses currently are offered in five general categories: wastewater treatment technology, treatment facility evaluation and inspection, water quality surveillance and monitoring, water quality analysis, and drinking water quality monitoring.

Students attend courses from all states and from some foreign countries. The largest percentage represent federal, state, and municipal pollution control agencies. A relatively small number of college and university instructors attend these short courses which are typically one week in length. USEPA encourages more participation by the educational community, so that current skills and knowledge will be transmitted to students to enable them to deal with pollution control problems as they enter environmental occupations. Community college and university instructors may attend courses free of charge by following prescribed application procedures.

Course Development

NTOTC is active in the field of course development. As new educational and training needs are identified, appropriate instructional packages are developed. Almost all such development is based on current research and agency regulations. Materials include instructor guides, student manuals, and supporting audiovisual materials. If USEPA's pollution control training programs are to be successfully implemented, college and university staff from various departments must cooperate and integrate these instructional activities within their curriculums or students will not be adequately prepared, either theoretically or practically.

Information Management

The goal of USEPA's information management system is to support, in a comprehensive and systematic manner, those involved with pollution control education and training. A central location within the NTOTC facility is designed to provide a contact point and to coordinate assistance efforts and has been designated the Instructional Resources Center (IRC).

As the education and training community has become more aware of the types of programs operated by the IRC, requests for information have expanded dramatically. In the past 12 months, about 1,200 letters and 400 telephone calls from a variety of sources have been received. Many requests for assistance from instructors, information specialists, municipal water and wastewater treatment plant trainers, and representatives of government and business have been received.

Through the IRC, NTOTC maintains a central location to inventory, evaluate, catalog, and disseminate instructional materials in the areas of water pollution control, water supply, and pesticides. Composed of several different but interrelated activities, it acts as a primary communications link between USEPA and educators at all post-secondary levels.

The IRC includes an audiovisual lending library housing 44 slide/tape presentations, 50 films and 79 videotapes, all available for free, short-term loan. At the present time, about 1,500 are loaned each year; the number of loans increases with increasing awareness of this supportive activity. Most subject areas available are water quality-oriented.

Interested persons are invited to Cincinnati to use IRC facilities for reviewing tapes, slides, films, and other materials before deciding about purchases or curriculum development requirements. IRC staff assist visitors by determining the most appropriate ways to use the Center's resources, or in determining educational and training program requirements and available resources. During the past year, universities and state and local governments have been assisted with curriculum design, course materials selection, and audiovisual support efforts.

Instructional information is cataloged by the Instructional Resources Information System (IRIS), a reference system listing about 2500 available water pollution control training materials. The citation for each item referenced includes title, author, institutional source, descriptors, an abstract, and a clear statement of source from which the item may be obtained. IRIS is available in print, microfiche, and computer versions. Those with printed copies can search for specific interests by using descriptor indexes. The Educational Resources

Information Center (ERIC) Clearinghouse for Science, Mathematics and Environmental Education (SMEAC) at The Ohio State University has been responsible for preparing the current version, so that it is now compatible with other clearinghouse operations used routinely by educational institutions. This cooperative effort offers some print reproduction services, as well as searches for particular types of information. Instruction in use of the various IRIS functions is provided at a series of one-day workshops, conducted periodically throughout the United States.

A recent innovation is the capability to conduct computer searches. IRIS has been mounted by Bibliographic Retrieval Services; institutions having remote terminal access to this service can easily search the file for appropriate instructional materials. Computer tapes will also be reproduced for those preferring to mount their own systems.

Another service resulting from cooperation with ERIC/SMEAC is the availability of the texts of many of the printed materials at the 700 ERIC microfiche collections located throughout the world where the documents may be reviewed free of charge.

Another new activity that has proven successful is a workshop oriented toward college, university, and community college instructors. The Water Quality Instructors' Workshop is held cooperatively with the University of Cincinnati each year. Approximately 30 individuals participate in becoming familiar with agency-developed and sponsored resources, descriptions of ongoing programs, and specific instructional techniques. Participants also provide feedback to USEPA to assist the Agency to determine instructional priorities.

One of our most successful efforts has been the production of the IRC Bulletin. This information bulletin provides educators and trainers with descriptions of model programs, current instructional materials available, educational strategies, and notices of forthcoming events. Instructors are encouraged to submit materials of articles.

NTOTC is moving in a positive direction toward more effective communications and dialog with the education and training community. Its future success depends on input and support from individuals, organizations, agencies, and institutions which themselves have use of pollution control materials for instruction. Although this model can and will be refined, it cannot succeed unless educators and trainers use the system to assist the Nation in reaching its pollution control goals. Regulation and enforcement of regulations and standards become more effective with a trained workforce and a knowledgeable public.

At the present time, more than 6000 individuals are on the mailing list to receive course schedules, the IRC Bulletin, and related information. Those wishing to be added to this list should send name and complete address to: Instructional Resources Center, NTOTC, USEPA, Cincinnati OH 45268.

PROGRAMS AND SERVICES OF THE DIVISION OF INTERNATIONAL EDUCATION, U.S. OFFICE OF EDUCATION, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Pat Kern McIntyre[1]

The Division of International Education of the U.S. Office of Education administers a wide variety of programs and services to increase international and global dimensions of American education through such activities as training, institutional and curriculum development, research, dissemination, and exchanges. The emphasis in many programs is on foreign languages and area studies of the non-western world. The Division also administers programs to promote cultural understanding and a wide range of staff services in the international education field.

The Division of International Education (D.I.E.) is responsible for expanding the international and global dimensions of America's education system and for promoting American citizens' awareness of other cultures. D.I.E.'s principal activities, are briefly described below.

With a staff of approximately 70 persons and an annual program budget of about $20 million, most activities of D.I.E. are carried out under one or more of the following legislative authorities: Title VI of the National Defense Education Act (NDEA) of 1958, as amended; the Mutual Educational and Cultural Exchange (Fulbright-Hays) Act of 1961; and the Agricultural Trade and Development Assistance Act (P.L. 480).

Details about each of D.I.E.'s activities may be obtained from the appropriate offices indicated by letters in parenthesis after each program description (see Appendices A and B).

Within the United States

Six programs for individuals and institutions are conducted primarily within the United States. Of those listed below, the first five are authorized by NDEA, Title VI, the last by the Fulbright-Hays Act.

- The International Studies Centers program provides grants to higher education institutions, or consortia of such institutions, to establish and operate centers focusing on one world region, or on general world-wide topics. Those centers focusing on a single world area offer instruction in two or more of that area's principal languages, as well as in other disciplines, in order to assist in the development of expertise in that particular world area. Awards are available in each category to centers having a combination of graduate and undergraduate instruction, as well as to those offering only undergraduate training. (C) 13.435A [NDEA]

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[1] Division of International Education, U.S. Office of Education, Department of Health, Education and Welfare, 400 Maryland Avenue, SW, Washington, DC 20202

- The International Studies programs provide two-year grants to higher education institutions or consortia of such institutions, to establish instructional programs in international studies at the graduate and undergraduate levels. Programs must be global or multi-area in instructional coverage.

  Graduate International Studies programs are designed to strengthen linkages among disciplines and between various international specialties and professional schools to bring an international, as well as interdisciplinary and/or comparative, focus to issues or topics of transnational concern. (C) 13.435C

  Undergraduate International Studies programs are designed to develop the international and global dimensions in the general education program of institutions, particularly in the first two years of post-secondary study. (C) 13.435B

- The Foreign Language and Area Studies (FLAS) Fellowships program [formerly the National Defense Foreign Language (NDFL) Fellowships] offers academic-year awards for graduate students in foreign language and area studies. The grants are made to selected U.S. higher education institutions. Programs may be interdisciplinary or multidisciplinary (including such fields as anthropology, economics, geography, history, linguistics, literature, philosophy, political science, sociology, or other professional studies) and must include study of the language(s) of the geographic area of specialization. (F) 13.434

- The Research program provides grants to institutions of higher education, organizations, and individuals to support surveys and studies to determine the need for increased or improved instruction in modern foreign language, area, and international studies, or to develop more effective methods or specialized materials for such training. (R) 13.436

- The Citizen Education for Cultural Understanding program provides funds to public and private agencies and organizations to support locally designed educational programs that increase the understanding of U.S. students about the cultures, actions, and policies of other nations. Such projects may provide for in-service training for teachers and other educational personnel, compilation of existing information and resources, and dissemination. (TF) 13.581

- The Foreign Curriculum Consultant program brings experts from other countries to the United States for an academic year to assist selected American education institutions in planning and developing their curricula in foreign language and area studies. The kinds of institutions given priority in securing the services of consultants are state departments of education, large school systems, smaller four-year colleges with teacher education programs, and groups of community colleges. (OP) 13.439

Abroad

Five programs conducted primarily abroad provide opportunities for individuals, groups, institutions, and non-profit educational organizations to conduct basic and applied research, engage in pre-service and in-service training, curriculum development, and the preparation or acquisition of instructional materials. All of these programs are authorized by the Fulbright-Hays Act.

- The Doctoral Dissertation Research Abroad program provides assistance for graduate students to engage in full-time dissertation research abroad in modern foreign language and area studies. Designed to develop research knowledge and capability in world areas not widely included in American curricula, the program aids prospective teachers and scholars who wish to conduct original research in their area of specialization and to enhance their knowledge of the region, its people, and its language(s). (F) 13.441

- The Faculty Research Abroad program offers opportunities for research and study in foreign language and area studies. It is designed to help higher education institutions strengthen their international studies programs by assisting key faculty members to maintain expertise, update curricula, and improve teaching methods and materials. (F) 14.438

- The Group Projects Abroad program provides grants to U.S. educational institutions or non-profit educational organizations for training, research, advanced foreign language training, curriculum development, and/or instructional materials preparation or acquisition in international and intercultural studies. Participants may include college and university faculty members, experienced elementary and secondary school teachers, curriculum supervisors and administrators and selected higher education students specializing in foreign language and area studies. (Projects in this category may be jointly sponsored by DIE and other OE offices.) (OP) 13.440

- The Seminars Abroad program provides opportunities for teachers of art, art history, world history, German, classics, and social studies curriculum specialists at the elementary, secondary, and college levels to participate in short-term seminars outside the United States. (TE) 13.437

- The Teacher Exchange program provides opportunities for elementary and secondary school teachers and, in some cases, college instructors and assistant professors to teach outside the United States. Various arrangements are made by the U.S. Government with other countries to provide for a direct exchange or a one-way placement of teachers. (TE) 13.437

Services

In addition to grant programs, the D.I.E. provides services in six major areas in the field of international education.

- The Comparative Education staff offers professional resource support to improve understanding of educational systems and programs abroad through preparation and publication of studies on educational systems of other countries; and providing consultative and technical assistance on education systems abroad to U.S. educational institutions, agencies, organizations, and individuals. (CE)

- The International Organizations staff works with international organizations including UNESCO, UNICEF, ECOSOC, IBE, OAS, WHO, and UNDP on educational programs and conferences. The staff prepares or directs the preparation of reports, surveys, and special studies on American education and assists in developing U.S. policy and position papers for use at international conferences; nominates American educators to serve on U.S. delegations to international meetings; and, for UNESCO recruits American educators for field positions in other countries. (IO)

- The International Visitors staff plans itineraries and provides educational counseling for visiting foreign educators who are not on U.S. Government grants; and, arranges appointments for individual foreign educators who wish to consult with specialists of the Office of Education and other offices of the Department of Health, Education and Welfare. (IV)

- The Educational Development staff arranges education training programs for teachers and administrators from other countries. Training includes regular courses, special seminars, and site visits to demonstration and research centers. (IV)

- The Clearinghouse staff responds to inquiries about student exchange programs, regular academic year-abroad programs, general educational tours of teachers and students, overseas employment, and programs of financial assistance to foreign students--activities that fall outside present OE international education programs and services. The Clearinghouse also prepares and distributes brochures, pamphlets, and other references describing D.I.E. programs and services, as well as activities in the field of international education in general. (OD)

- The Dissemination Specialist coordinates an information-sharing network for the advancement of international and global education among the states, local education agencies, institutions of higher education and international organizations; and facilitates communication between OE-supported programs and activities sponsored by other agencies, both public and private. (OD)

APPENDIX A

LETTER KEY AND PROGRAM ADDRESSES*

OD - Office of the Director

Telephone: (202) 245-9692

C - Centers

Centers and Research Section
International Studies Branch
Telephone: (202) 245-9588

CE - Comparative Education Section

International Services and Research Branch
Telephone: (202) 245-9425

F - Fellowships

Fellowships and Overseas Projects Section
International Studies Branch
Telephone: (202) 245-9808

IO - International Organizations Section

International Services and Research Branch
Telephone: (202) 245-2761

IV - International Visitors Section

International Exchange Branch
Telephone: (202) 245-9481

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*Each address is completed by addition of the following:

Division of International Education
Office of Education
U.S. Department of Health, Education, and Welfare
Washington, D.C. 20202

LETTER KEY AND PROGRAM ADDRESSES*

OP - Overseas Projects

Fellowships and Overseas Projects Section

International Studies Branch

Telephone: (202) 245-2794

R - Research

Centers and Research Section

International Studies Branch

Telephone: (202) 245-9819

TE - Teacher Exchange Section

International Exchange Branch

Telephone: (202) 245-9700

TF - 603 Task Force

Telephone: (202) 245-9425

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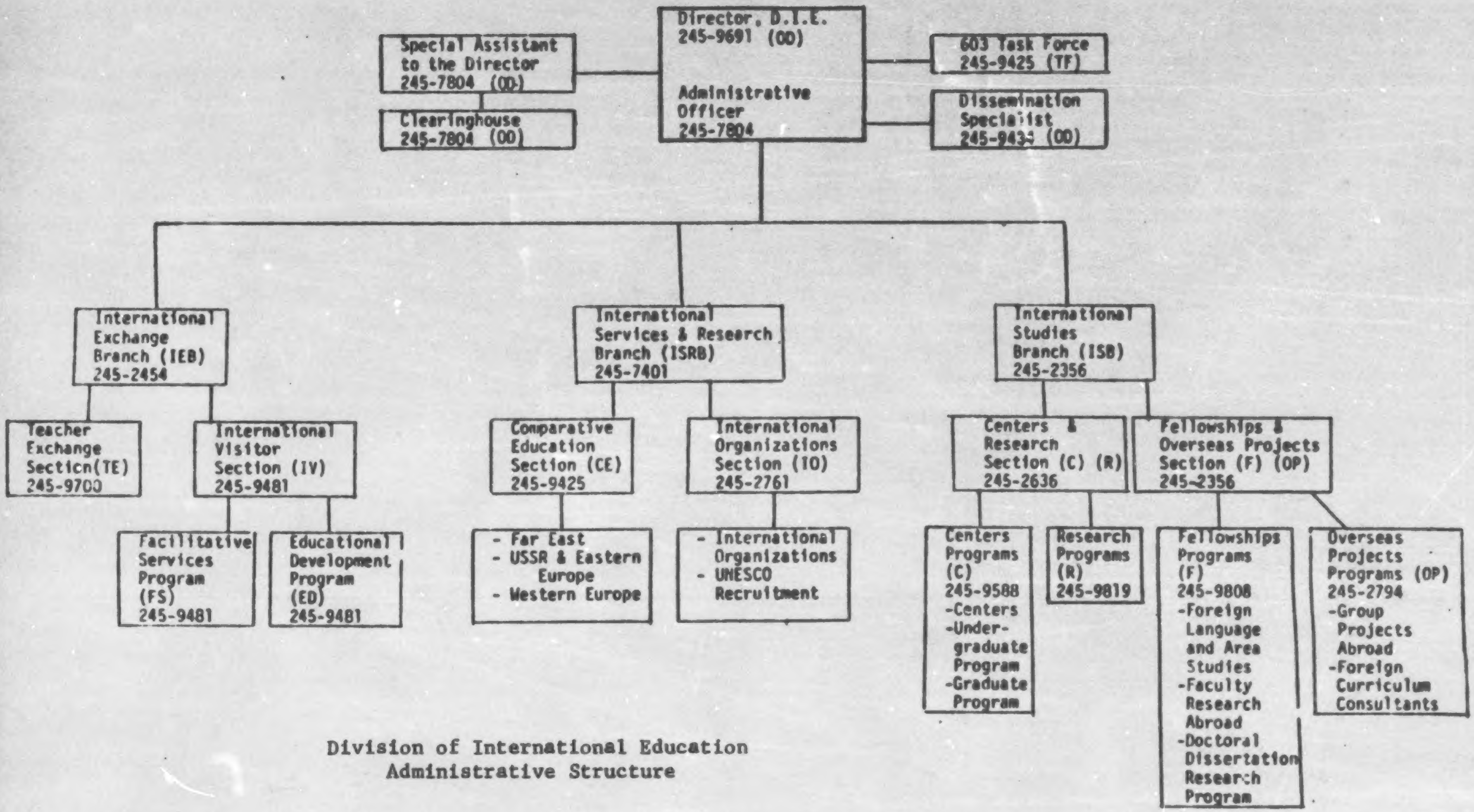
*Each address is completed by addition of the following:

Division of International Education
Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

APPENDIX B


Director, D.I.E.
245-9691 (OD)
Administrative
Officer
245-7804
Special Assistant
to the Director
245-7804 (OD)
Clearinghouse
245-7804 (OD)
603 Task Force
245-9425 (TF)
Dissemination
Specialist
245-9434 (OD)
International
Exchange
Branch (IEB)
245-2454
International
Services & Research
Branch (ISRB)
245-7401
International
Studies
Branch (ISB)
245-2356
Teacher
Exchange
Section(TE)
245-9700
International
Visitor
Section (IV)
245-9481
Facilitative
Services
Program
(FS)
245-9481
Educational
Development
Program
(ED)
245-9481
Comparative
Education
Section (CE)
245-9425
- Far East
- USSR & Eastern
Europe
- Western Europe
International
Organizations
Section (IO)
245-2761
- International
Organizations
- UNESCO
Recruitment
Centers &
Research
Section (C) (R)
245-2636
Fellowships &
Overseas Projects
Section (F) (OP)
245-2356
Centers
Programs
(C)
245-9588
-Centers
-Under-
graduate
Program
-Graduate
Program
Research
Programs
(R)
245-9819
Fellowships
Programs
(F)
245-9808
-Foreign
Language
and Area
Studies
-Faculty
Research
Abroad
-Doctoral
Dissertation
Research
Program
Overseas
Projects
Programs (OP)
245-2794
-Group
Projects
Abroad
-Foreign
Curriculum
Consultants

Division of International Education
Administrative Structure

SCENARIOS: A WAY OF INTERVENING IN THE FUTURE

John Miles[1] and Skip Everitt[2]

A scenario is a written description of the future. It portrays in vivid and graphic language the cumulative impact of an entire series of events. Scenarios depict what life will be like in a future moment. In most cases, forecasters generate two or more scenarios to describe the range of possible futures related to any given list of future events. Traditionally, this "family" of scenarios includes 1) a scenario which describes the worst possible state of affairs for a given moment in time; 2) a utopian or best possible state of affairs; 3) a scenario based on simple extrapolation of existing trends; and 4) one or more scenarios based upon one particular phenomenon, i.e., high technology, appropriate technology, ZPG, nuclear war, etc.

By conjecturing a "family" of scenarios, the forecaster sets forth a range of possible futures.

The Role of Scenarios in Forecasting Environmental Futures

Environmental issues are specially well-suited for scenario writing. The historical log of environmental problems in the U.S. describes a series of events that are largely non-linear in their occurrence. Oversimplified linear extrapolations of isolated events such as pesticide application, leakage in nuclear power plants, and visitor use of wilderness areas have indicated that these phenomena were--barring no extreme variations or related events--relatively unimportant. However, time and time again we face the "extremes" characterized by a blowout at Santa Barbara, the break up and destruction of the "unsinkable" Amoco Cadiz, a near melt-down at Browns Ferry and Three Mile Island, and the occurrence of the "Dallas Syndrome" (known by others as Californication) in Anchorage during the installation of the Trans-Alaska Pipeline. Scenarios provide the forecaster with the flexibility to blend extrapolated data, "best guess" trends, and imagination into a rich narrative which allows for "thinking the unthinkable" (to borrow a phrase from Herman Kahn).

Scenarios May Create the Future as Well as Predict It

When completed, a carefully constructed scenario answers at least two questions:

1. What is the range of possible future conditions for a series of given events?

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[1] Huxley College, Bellingham, WA 98225.

[2] Southwestern at Memphis, Memphis, TN 38112.

2. What are the possible desirable or undesirable future conditions that can be dealt with now or in the near future to nurture or prevent their occurrence?

In other words, as a planning device, the scenario can be used as "documentation" or justification for creating or "inventing" the future (a borrowed phrase from Warren Ziegler). Thus, the activist, politician, planner, businessman, or manager moves from quasi-scientific prediction to self-fulfilling prophecy. When used as "inventive" devices, scenarios can become powerful political and financial tools in the hands of pressure groups or policymakers.

Scenarios are Appropriate for a Variety of Writers

The three basic skills required for scenario writing are literacy, logic, and imagination. Assuming that these skills reside in an individual or group theme, the process may proceed. Recently, a group of high school students in Memphis wrote scenarios depicting education in the year 1998--a year which will see many of the offspring of this group of Memphis high schoolers enter the ninth or tenth grade. Their scenarios have been credited with bringing about a major policy change regarding the reestablishment of neighborhood schools. The spectrum of scenario writers is broad. In the past year clergy, planners, realtors, and community theatre directors have engaged in scenario writing in Memphis alone.

The Basic Process

In its most basic form, scenario writing incorporates the following ordered steps:

1. Assemble a group or team that has a common and identifiable concern (environmental protection, profits, civil rights, change, etc.).

2. Provide the group with available data (reports, articles, position papers, printouts, etc.).

3. Assign members of the team or teams within the group to scenario areas (doomsday, utopia, technological fix, etc.).

4. Ask individuals to construct "future histories" or chronologies which describe the nature and sequence of events from the present to the agreed-upon future moment (2000, 1990, 2010, etc.).

5. Ask teams to compare future histories, agree on a team history, and appoint a principal scenario writer.

6. Make sure teams discuss the future state of affairs while the writers construct outlines or rough drafts for the scenarios.

7. Encourage teams to refine their drafts for presentation to the whole group or to decision makers.

Scenario Writing at the 1979 NAEE Preconference Workshop

The participants in a workshop sponsored by the Environmental Studies section of NAEE and held at Smith Mountain Lake in advance of the Eighth Annual NAEE Conference were given position papers prior to their arrival. The following questions were suggested by Skip Everitt and John Miles as guidelines for the individual Task Forces that had been established:

1. Do the position papers explicitly or implicitly identify events, trends or future states of affairs that can be incorporated into a future history?
2. Which refinements, additions or deletions are necessary for construction of future histories?
3. What can we realistically accomplish in a day and one-half together? What do we emphasize? (Ecological futures or educational futures?)
4. How can we most effectively report out our results to the NAEE Conference?

We found that the scenario writing process was overall sound and worthwhile. However, some obvious shortcomings emerged during the workshop:

1. The time frame for implementing scenarios was too brief. An intensive retreat workshop becomes a micro-community. We needed more time to clear our minds of our job pressures and to get to know each other.
2. The three scenario domains--energy, lifestyle, and ethics--were actually only two domains. Lifestyle and ethics were found to be overlapping rather than discrete.
3. While the position papers were helpful, participants expressed a need for more readings and advance preconference preparation.

Generally, the scenarios which were developed were imaginative and indicated considerable reflection and "futures perspective." It was the consensus of the group that scenario writers can be a very useful tool in environmental education and environmental studies classroom efforts.

THE TINKER TRUCK — EE IN MOTION

Marla Painter, Weedith Evans,
and Carol Nimick[1]

The Tinker Truck is a mobile environmental education program of Foresta Institute for Ocean and Mountain Studies, located in northwestern Nevada's Washoe Valley. The program is designed to meet the environmental education needs of rural Nevada, many of which are the same needs as those of other large western states. It is unique because it utilizes art as a channel for building environmental awareness in the learner and the basic skill requirements of perception and observation abilities. It is a "charmer" of an antique pick-up truck. On the back of the truck is a cabinet that unfolds to reveal exhibits, resources, and drawers of supplies that are easily carried into the class.

The adoption of the Tinker tradition comes from an old American folk tradition of roaming Tinkers, traveling from town to town repairing household items, many made of tin, and peddling a variety of specialty goods made in the larger cities and difficult for rural folk to acquire. These "jolly" fellows had a simple life style and would "mend rather than spend." This tradition was applied to the mobile environmental education project by having our Tinkers peddle a variety of learning activities. The Tinker Truck goes from town to town to provide resources and firsthand experiences for rural schools and communities thirsty for the vitality of outside resources.

Just as rural people were isolated in the past from stores and repair facilities, now rural communities in the West are removed from learning centers, museums, and other metropolitan cultural centers. Often, they are not exposed to the experiences of the American heritage, of changing life styles and of contemporary environmental degradation. Without stimuli from such centers, children's understanding of their place in cultural and natural history is restricted. Consequently, seeing the world as an integrated whole is even more difficult due to their isolation. It is in response to this need that the Tinker Truck program was designed by Weedith Evans, Carol Nimick, and Happy Paffard at Foresta Institute.

The Program Goals

The goals of the Tinker Truck program are: a) to carry the educational objectives of Foresta Institute to the isolated rural areas of Nevada; b) to develop methods of accomplishing environmental education objectives through the arts; and c) to develop a mobile environmental education program aimed at the small, isolated, rural community. It can be a model for other states.

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[1] Foresta Institute, 6205 Franktown Road, Carson City, NV 89701.

The educational objectives which Foresta wishes to carry to the rural communities are the following:

1. To design a curriculum that will foster personal and intellectual growth and the development of creativity and enthusiasm within and for the learning process;
2. To help students and teachers gain a deeper appreciation and understanding of their diverse natural environments;
3. To help students and teachers gain a deeper appreciation and understanding of their rich cultural heritage and the critical interrelationships between natural systems and human cultural systems;
4. To help students develop a process of valuing and a sense of commitment to their community and natural environments so that they become a contributing element in improving the quality of life through channels of constructive change;
5. To help teachers learn to utilize environments outside of the classroom with the tremendous diversity of learning resources the community has to offer;
6. To provide teachers-in-training with practical experience in innovative curriculum planning and implementation; and
7. To disseminate the program as a model, nationally and internationally.

Foresta's environmental education approach is built on the ideas and work of environmental educators everywhere and is in response to Foresta's precepts of education. Education must equip people to understand the laws governing the operation of the systems in which we live. The reasons for the importance of this are many; theoretically, if people know how a system operates--whether an ecosystem or an engine--they can also perceive and understand dysfunction in that system. It is then possible for them to make decisions as citizens that will perpetuate healthy functioning of the systems which make up our environment. Inherent in our view of a system is that "natural" and "human" cultural systems are interdependent and reflective of one another. Education must also respond to the creative, intuitive elements of learning as well as the rational, cognitive sides presently emphasized in our school systems. Recent research has indicated that the right hemisphere of the brain dominates the affective aspect of learning and the left side, the cognitive. In a sense, education has inhibited a large portion of the human learning potential by not developing the right hemisphere of the human brain. There is a need to reawaken this metaphoric side of our mind to develop our full learning capacity.

The truck itself is a renovated 1948 Dodge pick-up with built-in cabinets and storage space on the back. Weedith Evans, the builder and designer of the truck's renovation, paid special attention to every detail of the vehicle. Because of this care, children and adults are immediately captured by its charm and interested in what it carries for them. Within the cabinets, people find drawers, cubicles, a feely box to explore. In addition, the truck carries art work from schools previously visited, a library concerning folk art and designs in nature, and a patchwork of drawers. One drawer is full of hats for role playing; another, musical instruments to sound out the wind; for sketching, an ink drawer; for turning fleece into yarn, a drawer with spindles. These are the wares the Tinker Truck carries with its "Tinkers," going from town to town to sharpen the environmental awareness of elementary school students.

Program Content and Methodology

The Tinker Truck program is diverse, and there is an ever-growing repertoire of activities and experiences developed by the staff to meet the different needs of the communities. The primary goal, however, is in tending to the environmental awareness of the learner so that she or he can perceive her or his surroundings, grow curious about them and desire to learn how global systems work. Our hope is that they learn to love and care for their surroundings. The program is a combination of presentations by the Tinker Truck staff (we call them Tinkers) and workshops both in the schoolyard and the classroom. Additionally, workshops for teachers and community-wide educational programs are provided. An interdisciplinary approach to environmental awareness is used with an emphasis on sensory exercises and art activities. Educating the senses takes people above and beyond what we gain from the second-hand experiences of books and television. By overemphasizing the verbal and visual world, subtle perceptions are less frequently felt by people. By immersing students in their environment, they become personally involved and gather strong impressions which can work as a basis for artistic interpretation. The Tinkers blindfold students, hoist them to a high vantage point, crawl around with magnifying glasses, sit in a special place for five minutes of silence, make music. The arts are used as a channel for environmental awareness in order to balance the more commonly used cognitive approaches to environmental studies. Simple observation and perception are basic skills to develop.

Artists and ecologists see the world in similar ways. They both have broad points of view; they see how things fit together; they sharpen their ability to observe differences and details. Consequently, discovering ecological principles through art is a fruitful approach. By utilizing the concepts of diversity, interdependence, adaptation and change, the learner discovers both aesthetically and empirically that reality is, as David Bohm states, an "inseparable interconnectedness." Seeing their environment in new ways through different art forms, students come up with their own insights and feelings about the site --perceptions which may never have been brought out through only scientific or mathematical analysis of the environment. A personal expression of these insights is the beginning step toward the independent thinking and attitude formation necessary for responsible citizenship. The experience of expression, not the artifact, is intrinsically important. What is crucial is doing artwork for one's self, a mark of one's unique existence. Being aware of one's own ability to create, change, and discover, helps one to deal with the everyday job of problem solving. It also is the key to a positive attitude toward living.

Usually art activities should begin with an exercise to catch the students off their guard and free them from the fear of not fulfilling preconceived notions of what art is supposed to be. An exercise such as "crazy animals" can do this:

LOOSEN UP -- CRAZY ANIMALS

> With a crayon, draw the most unique, outrageous, monstrous creature imaginable. Have your creature embody every and any kind of adaptation that helps it 1) move, 2) eat, 3) protect itself. Adaptation might first be discussed with the aid of study skins or large pictures. How will your crazy animal eat its dinner?

Art activities such as printing and rubbing are highly successful, encouraging students to enjoy further art work. Group art projects--skits, murals, puppetry, collaborative poems--take the attention off the individual's self-consciousness about her/his artistic ability. By working with many art forms, such as graphic art, lively art, and folk art, all students find activities that especially delight them. The graphic arts also direct students toward concerns about aesthetics and design of a quality natural and manufactured environment. The folk art activities involve students in skills lost with twentieth century mechanization and exemplify many non-consumptive activities with human rhythms. Folk art also opens up ways of looking at the relationship between people and the resources the land offers for expression. Music, drama, and literature provide direct channels for attitude examination and expression, an exploration of values and tradition.

The Tinkers present the program so that the students feel the joy of doing art; if the object is to make things, we end where we start, with things. The objective is to have something happen to the person doing the art activity. The skills learned promote self-worth by giving the students an experience in shaping an object, an environment, even a life style.

Upon arrival at a school, the Tinkers acquaint themselves with the principal and/or teachers, making final class schedules and inquiring about current subjects of study to fit into the Tinker Truck activities. They also acquaint themselves with the schoolyard and potential field trip sites. The program begins in the class with introductions, especially to the truck itself, affectionately known as Esmeralda. The class gathers around one side of the truck and then the other to investigate the exhibits and drawers. Students love to pull out the drawers, and in the process are prepared for the workshops. After helping to carry in the necessary supplies, the children settle into a drawn story about Tinkers of the past and Tinkers of the present: how they travel from town to town and would rather mend than spend. A poem about the jolly tinkers is shared by all.

The workshops often start with leaf rubbing, which leads into the package of textural exercises; schoolyard scavenger hunt for textures which form a rubbing composition; texture drawing done by just feeling objects hidden in bags; blind walks; collaborative texture poems. Such texture exercises are background for spinning and weaving in a subsequent folk art session. The content of the introduction is always the same but an effort is made to expose each class to different study units and to maintain a continuity in subsequent visits to the class and school. Concepts and activities are geared to the class level and teacher presence is required. Teacher in-service sessions are encouraged to train the teachers in the approach and techniques of the Tinkers. "The Tinker Truck Book," containing an activity sampler, is left with each teacher for follow-up activities. Because the schools are small, one- or two-day visits are adequate. Ideally, the Tinker Truck would be able to visit the schools at least twice each year.

The idea of the Tinker Truck is applicable to many regions of the country, although the Western states are particularly in need of such a resource. Of course, not everyone needs to follow the exact model of a "Tinker Truck." Such an idea is useful, however, because it captures the imagination of children and adults. Seeing a bright yellow antique truck pull into town with smiling faces inside is delightful for all. Lending some magic to the vehicle is also useful in interesting people in it. Promoting the virtues of living in a rural setting is supportive psychologically to people who feel isolated and who, were it not for work, might choose to be elsewhere. The Tinker Truck attempts to be a celebration of rural living, in addition to its other features.

The major topic that arises between people discussing projects similar to the Tinker Truck is that of funding. The only success Foresta has had in overcoming this persistent problem is in seeking support from a variety of sources for whom different aspects of an idea have appeal. The schools pay a modest fee of $35 per day.

Our hope, and that of many rural Nevadans, is for the Tinkers to be a regular part of the Western landscape. We hope, also, that art will become used by more environmental educators and that the joy of exploring and discovering one's surroundings will be less limited to those away from metropolitan areas through the idea of mobile programs.

ENVIRONMENTAL EDUCATION AT THE OHIO STATE UNIVERSITY

Robert E. Roth[1]

The School of Natural Resources of The Ohio State University is responsible for professionally-oriented programs leading to employment in natural resources management and environmental education, and for coordinating efforts in various disciplines from a variety of colleges within the University interested in the development of such programs. The school is guided by an advisory committee representative of the disciplines interested in environmental and natural resources managment, and administered by experienced professionals with similar education and experience. The programs offered are interdisciplinary, and courses are utilized from many disciplines, departments and colleges of the University.

The goals of the program are to develop a holistic view of man in relation to his natural resource base and to train natural resource managers who understand this view.

The program is designed to develop personnel capable of filling managerial, research, and educational roles in natural resources and environmental fields. More generally, the program hopes to develop an awareness by students from all disciplines of man's dependence on a finite resource base and of man's responsibility to manage resources to assure a quality environment. Research, extension, and resident instruction functions are strategies used to achieve these objectives.

The programs of the school are organized by subject matter divisions corresponding to environmental/resource specializations.

Other Facilities and Related Programs

The School of Natural Resources has a 1300-acre tract of forested land, with lodging facilities for individuals and groups in the Clear Creek Valley of Hocking County. The tract is known as the Barnebey Center for Environmental Studies and is utilized for resident environmental education, field trips and for graduate study.

Environmental Education Undergraduate Programs

The area of discrete academic concern of the Division of Environmental Education includes the basic knowledge of natural resources management and methodologies appropriate for programs in environmental education, communications, and interpretation. The knowledge base is in four interrelated areas: Biophysical (BP), Sociocultural (SC), Change, and Management (Mgt). The following model illustrates the relationships between content and/or knowledge areas, methods and intended audience:

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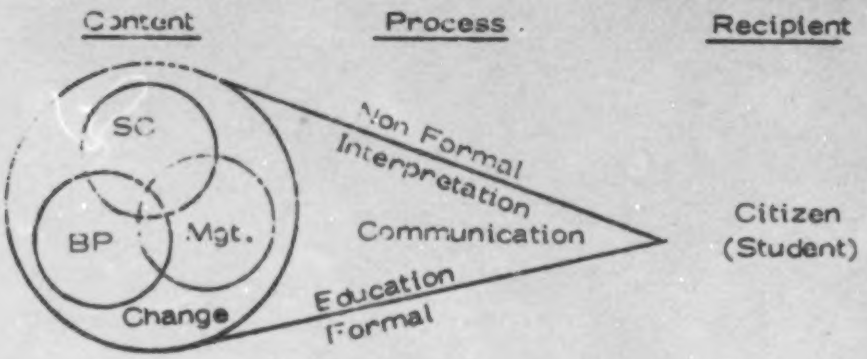
[1] Division of Environmental Education, 246 Lord Hall, The Ohio State University, Columbus, OH 43210.



The Division of Environmental Education emphasizes the application of the above concepts through the information delivery processes of environmental education, communications, and interpretation. All three program areas are within the more general concern of education, broadly conceived.

The Division of Environmental Education conducts public service (Extension), research, and resident instruction undergraduate and graduate programs in the areas of environmental communications, education, and interpretation.

1. Environmental communications includes the content base above and a study of: communications theory, analysis techniques, information dissemination, modeling, budgeting, evaluation, and research approaches applicable in various media in relation to resource use and environmental management/education.

2. Environmental education utilizes a content and methodological base including study of: concepts of environmental management and natural resources, natural history, resource agencies, interactions of resource management, watershed evaluation, gaming and simulation in resource management, programming and planning, resident outdoor education, curriculum and activity development, conservation education methodologies, research, evaluation, and theory.

3. Environmental interpretation includes study of: the concept of the interpreter, interpretive principles and techniques, visitor characteristics, information services, interpretive centers and exhibits, interpretive planning and programming, evaluation, research, and theory.

The above areas of academic concern are based upon research in environmental and resource management, educational and social psychology, curriculum development, communications, education, and interpretation methodology (Table 1).

Double Degree Program in Environmental Education

A Double-Degree Program is a formalized arrangement between the School of Natural Resources and the College of Education. By this arrangement, a student may be enrolled in both colleges and by completing a specific program in each with a minimum of 241 quarter hours will receive a Bachelor of Science in Natural Resources and a Bachelor of Science in Education. The double-degree with the College of Education yields teaching certification for undergraduates. Students may alternatively choose a post-degree program that yields a Master's degree and teaching certification.

Graduate Program in Environmental Education

The graduate program in environmental education is developed in consultation with an adviser at the Master's level, and with a committee at the Ph.D. level. The basic foundation which students should experience is outlined below:

I. Environment:

1. Ecology - An understanding of basic ecological principles; the dynamics of ecological systems; and natural and man-influenced processes affecting ecosystems.

2. Human Ecosystem - An understanding of the structures of and relationships among institutional arrangements, the flows of power and influence, and impact of culture, values, and law on decision making within the human ecosystem. A thorough comprehension is expected of the linkages among the physical, cultural, and biological processes which affect man and the biosphere.

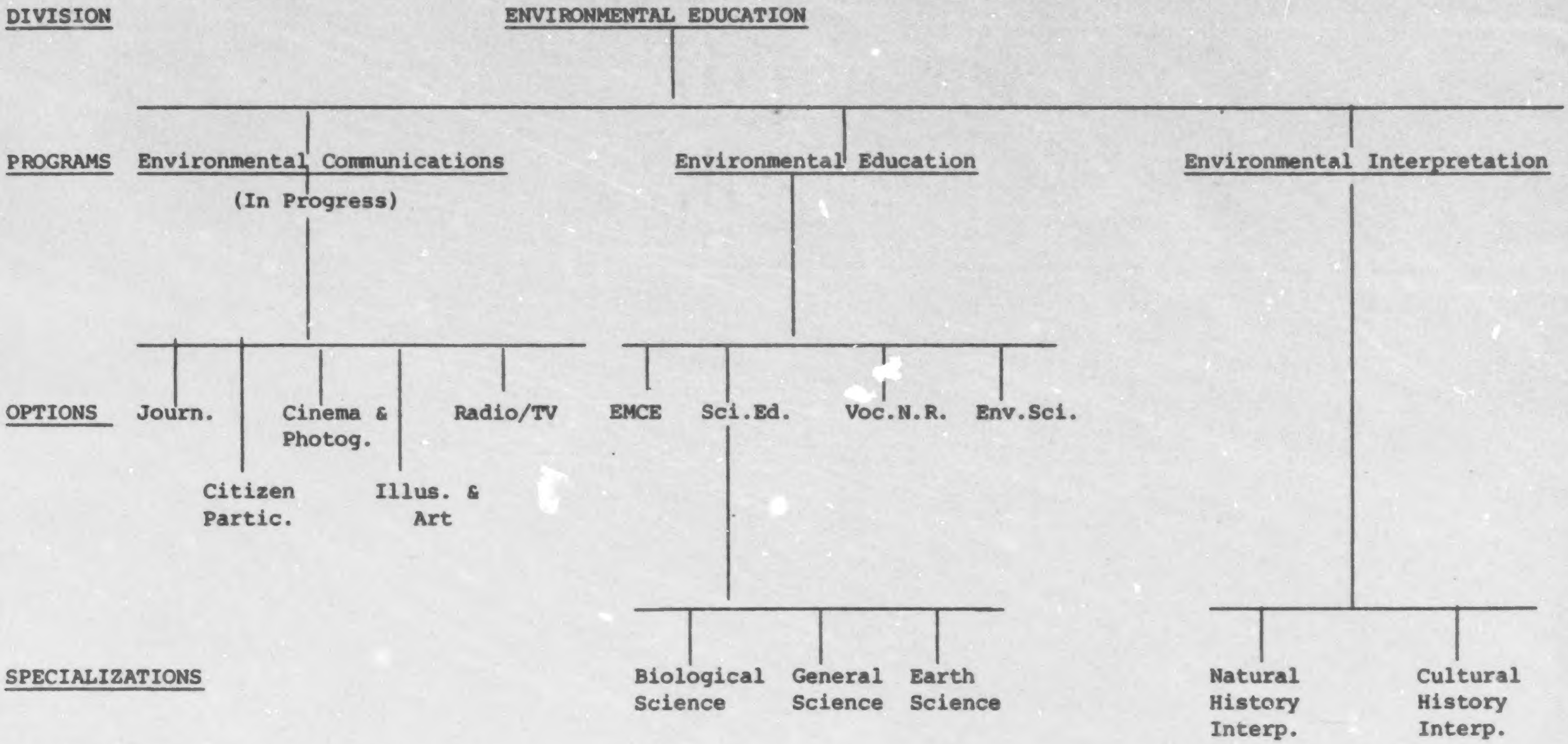
II. Management

1. Economics - An understanding of micro and macro-economics theory; evolution of American economic thought; natural resources economics; and the integration of ecological and economic principles in promoting human welfare.

2. Policy - An understanding of: governmental structure function, and relationships at all levels of government; historical development of political thought and policies that have affected management of our environment; process and formulation and implementation of environmental policy; and the role of citizens and organizations in this process.

Table I

PROGRAM AREAS OF THE DIVISION OF ENVIRONMENTAL EDUCATION, SCHOOL OF NATURAL RESOURCES AT THE OHIO STATE UNIVERSITY


DIVISION
ENVIRONMENTAL EDUCATION
PROGRAMS
Environmental Communications
(In Progress)
Environmental Education
Environmental Interpretation
OPTIONS
Journ.
Citizen Partic.
Cinema & Photog.
Illus. & Art
Radio/TV
EMCE
Sci.Ed.
Voc.N.R.
Env.Sci.
SPECIALIZATIONS
Biological Science
General Science
Earth Science
Natural History Interp.
Cultural History Interp.

III. Communications

1. Education - An understanding of the views and practices of present and past educational philosophies and theories; the trends, movements and problems in education, philosophy, content, and methodology appropriate for environmental education and interpretation.

2. Communications - An understanding of the dynamics of public opinion, the formation and change of attitudes; and the techniques, skills, and media of use in disseminating information; and processes by which people acquire and integrate information into their lives.

IV. Research methods

1. Analytical skills - An understanding of the process of data collection and analysis for scholarly research, including knowledge of statistics, research design, and the role of simulation, gaming, and modeling in environmental education and management.

Admission to the M.Sc. program in Natural Resources requires a relevant undergraduate specialization with record undertaking of competence, indicating capability of graduate work. Intent to prepare for some kind of educational communications work is also an expectation.

Core Courses: The following courses or their equivalents constitute the common core for environmental education graduate students at the M.Sc. level:

Natural Resources 600 - Natural Resources Policy;

Natural Resources 601 - Interactions in Resource Management or equivalent in advanced ecology or resource economics;

Natural Resources 785 - Research Methods in Natural Resources Management or equivalent course/s in statistics and research;

Natural Resources 897 - Graduate Seminar.

Both non-thesis and thesis options are available.

Non-thesis Option: Fifty-five minimum hours, to include two papers, developed through individual study; comprehensive examination.

Specialization Program: There is no limit on courses or hours taken in other departments. Students have opportunity to propose their own programs, but coherence is an important criterion. Many departments have relevant offerings. The graduate student is obligated to propose and discuss his program as a condition for acceptance.

The Ph.D. Program is developed individually under direction of a faculty committee, with approval of the Graduate School. The interdisciplinary program must include in-depth course preparation in either a discipline, resource or educational specialization in an interdisciplinary program of courses approved by the graduate committee.

Environmental education is directed at modifying our attitudes toward our world--both the world of nature from which we derive and inherit our responses and the world which we are creating. As our attitudes are reflected in informed democratic processes, both in the polling booth and in the marketplace, we must recognize that whatever happens or is not permitted to happen to this world can be substantially influenced by a majority vote. This "vote" by each individual man, woman, or child is determined by his or her attitudes toward self, toward others, and toward the quality of life for all. This means that self-respect, respect for our fellows, and respect for the living earth must be encouraged. The philosophy of the Division of Environmental Education at The Ohio State University is oriented to that end.

DESIGNING ENVIRONMENTAL EDUCATION INTO THE CURRICULUM: AN INFUSION APPROACH

Larry Schaefer,[1] Jack Culbert,[2] Nancy Hungerford[3]

> *My interest is in the future, because I am going to spend the rest of my life there.*
>
> C. F. Kettering

Introduction

Most educators agree that Environmental Education (EE) should be dedicated to producing environmentally literate citizens. Such a process should produce citizens equipped with factual and unbiased information concerning the basic ecological systems, skilled in problem-solving and decision making, and motivated to take an active role in working toward the maintenance of an ecologically-sound environment.

The ultimate objective of involvement in an environmental learning program is to enable people to think reasonably and thoughtfully about their environment. This will come about through specific and continued experiences with the environment. Any single experience is not enough. In time, experiences will accumulate to the extent that students can perceive patterns and causes and effects which make sense to them and which relate to other aspects of life.

In order to reach this goal, it is important that students have environmental learning experiences on a continuing basis throughout their lives. There are basically two approaches to implementing EE to reach this goal:

1. Environmental Education uses the skills and information of various disciplines;
2. Each discipline can use environmental activities to teach the knowledge and skills of that discipline,

The problem of the first approach is that if we continue to "take time out" from the everyday instructional program to deal with environmental problems they will remain adjunct concerns. In addition, there is always the problem of one more unit in an already crowded program.

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[3] ACES Environmental Education Center, 800 Dixwell Avenue, New Haven, CT 06511.

On the other hand, if we prepare a program of instruction which is customized with or has environmental objectives built in, our attention to such concerns will be as regular and automatic as the social occurrence of the problems themselves. It is this second alternative that has been developed in this project which has resulted in an EE Infusion Activity notebook.

Infusion

Infusion is not a new concept. It is in fact an integral part of the entire educational process. All teachers strive to integrate and piece together for their students the many topics, subjects and categories that divide the school day. Writing skills are not isolated exercises to be performed during an English lesson, but are important tools of communication in science, social studies, and the language arts.

Our EE Infusion Project is a two-fold response to this aspect of the teaching process. In response to the crowded curriculum, the infusion approach frees teachers to "environmentalize" their classrooms. By selecting one or more EE infusion activities, a teacher can highlight the environment as key points throughout the school year. Perhaps more importantly, by integrating environmental education in a multitude of disciplinary contexts and topic areas, students' thinking may come to reflect an environmental ethic which spans individual curriculum topics.

The Development Strategy

Our development strategy for the infusion activity notebooks involved four major phases. The first phase focused on teacher training. In the fall of 1977, we conducted 30 outreach workshops in area schools to explain and illustrate the essence of Environmental Education as well as to explain the curriculum development effort. The purpose of these visits was to stimulate EE activity, enlist participation by the schools in the project, and encourage teachers to participate in the curriculum writing team.

In order to participate in the team, teachers were required to take a graduate, curriculum-design course entitled "Designing EE Into the Curriculum" offered by the center staff through a local university. The course was offered with subsidized tuition to encourage participation. The course was designed to develop curriculum writing skills and improve EE background.

The Curriculum Development

Following the writing course and curriculum analysis, a summer curriculum institute was conducted (Phase II). Based on performance in the writing course, twelve teachers from the course were invited to participate in the institute. In addition to the teachers, the staff of the institute included two team leaders, three editors, a resource specialist, and a content specialist. Each teacher contracted to produce 15 curriculum activities.

The primary objective of the Environmental Education Center (EEC) Infusion Project was to closely link participating school district curricula with opportunities in EE. These opportunities were identified by the EEC staff prior to the institute, using school district curriculum guides and the EEC resource library, and were integrated into a giant matrix (Phase III). The horizontal axis recorded the 65 science and social studies curriculum topics gleaned from a careful analysis of school programs. The vertical axis, a framework for environmental education, was conveniently divided into seven major topics. Figure I is a simplified representation of the matrix.

Using this matrix, the two writing teams worked diligently to create and rework curriculum activities to highlight the environmental issues which emerged from these curriculum areas. Ideas for activities were formulated during team brainstorming sessions, and writers cooperated to improve the quality of one another's work. Drafts were read by team leaders for curriculum content, environmental content and classroom viability. Based on feedback from the team leaders, teachers revised and improved their activities.

Following the acceptance of each activity by the team leader, the activity entered the final or production phase (Phase IV). The activity was edited, typed and graphics added. In order to increase the usability of the product, each activity had an identical format. This format included: Curriculum Topic, Environmental Topic, Skills, Site, Objective, Teacher Background, Preparation, Vocabulary, The Activity, Procedure, Related Activities, Resources, and Student Worksheets.

The final product of the infusion, curriculum-development project was Earthwatch, two EE activity notebooks. Volume 1 of Earthwatch focuses on grades 3-5 and Volume 2 on grades 6-8. Each is a collection of carefully designed activities written in identical format to encourage environmental literacy.

There are three ways to enter the notebook: (1) use the list of curriculum topics in the Table of Contents; (2) use subject index at the end of the notebook; or (3) use a listing of activities arranged by environmental topic.

EE Competencies

The infusion approach to EE as applied in the Earthwatch curriculum offers a practical approach to EE, but may not insure the sequential development of EE concepts and skills. Recognizing that the Earthwatch activities could lead teachers to adopt a shotgun approach to EE, the EEC staff sought to construct a conceptual model which would provide teachers with a guide for specific competencies to be mastered at each grade level.

Initial attempts at model development involved researching existing conceptual models. These models were found lacking in three important respects.

FIGURE I

REPRESENTATION OF WORKING MATRIX RELATING ENVIRONMENTAL AND CURRICULUM TOPICS

Curriculum Topics / Environmental Topics	Examples of Social Studies Topics							Examples of Science Topics							
	Africa	Colonial Period	Geography	Primitive Societies	Social Change	Urban Studies	Westward Expansion	Biology	Endangered Species	Energy	Health	Matter	Oceanology	Safety
Ecosystems														
Population														
Resources-Energy														
Economics, Technology and Culture														
Environmental Policy														
Environmental Quality														
Environmental Ethics														

1. Most existing conceptual models are inconsistent with the infusion approach in that they have little connection with what is being taught within district schools.

2. Most existing conceptual models assume that student mastery of the concepts central to the natural sciences guarantees competency in environmental education. Existing frameworks minimize humankind's interaction with the natural environment and downplay the resulting environmental dilemmas.

3. Many conceptual models offer simplistic and merely descriptive objectives for observing the natural environment and avoid more complex environmental issues and skills.

Dissatisfaction with existing models led the EEC staff through a process of development which would provide EE concepts and competencies at each grade level. These competencies would focus on human interaction with the natural environment as well as facilitate the infusion of EE activities within existing district curricula. This process consisted of the following steps:

1. Identifying the major concepts in EE contained under each of the seven topics (Figure 1) included in Earthwatch.

2. Identifying the concepts and competencies students need to master prior to the introduction of environmental competencies.

3. Writing behavioral objectives for each of the EE concepts and for each grade level. A conscious decision was made by the staff to limit EE competencies to those dealing with human interaction with the environment. To be candid, we assumed that teaching the natural sciences and calling it EE was insufficient. It is our desire that teachers teach the natural sciences but be under no delusion that they are teaching EE.

4. Conducting a series of working sessions with district teachers at each grade level to obtain a reaction to the curriculum assumptions the staff made as a result of step three. Objectives were revised in accordance with teacher reaction and evaluation. In addition to facilitating the grade level placement of specific objectives, it was the goal of EEC staff to demonstrate to teachers the opportunities for infusing EE objectives in their present curricula.

5. Identifying or creating activities for each concept and objective at each grade level to be infused in specific subject areas.

   Example:

EE Competency	Grade	Subject (Curriculum)	Resource	Page Nos.
the learner will identify one natural cycle of which they are part	K-3	science language language arts	EARTHWATCH OBIS EARTHWATCH	Vol. I, p.58 Set I Vol. I, p.89

6. Disseminating the final product. The task is insuring that teachers are aware not only of the objectives but of the activities to implement the objectives. This requires demonstrating to teachers how the goals of EE can be achieved with a minimum of effort.

Using Earthwatch

It is this phase of the infusion project, dissemination and use, that is actually the final link in an environmental growth cycle which has emerged from the curriculum development project. In this phase we link the EE competencies to Earthwatch and other environmental curricula in order to match and teach the curriculum goals of individual school districts. By directly tying the competencies to the goals and plans of the classroom teacher, we convince them that EE is not only an important educational goal but a possibility for the classroom. By bringing them into our process such that they sample the Earthwatch concept in their classroom, we raise their level of awareness and thus insure that they will continue to grow as environmental educators.

Our conclusions regarding both the process and product are listed below:

1. The work involved in terms of staff time were grossly underestimated. We are convinced that implementation time will offset development time because we are using subject matter and concepts with which teachers are familiar.

2. The development of specific competencies for EE has advantages and disadvantages.

    (a) The competencies will provide a tool for evaluating a school's curriculum for its EE content. In addition, a mechanism for strengthening the content without major curriculum alterations will be available.

    (b) The competencies will provide teachers with a political wedge to incorporate EE goals into school curricula.

    (c) The Environmental Education Center will have an internal tool for evaluating its many professional development services.

    (d) Teachers who feel they teach all environmental concepts when they teach natural science may be alienated. They will be asked to alter significantly their understanding of EE.

    (e) The assumptions made of what is already taught by teachers in subject areas may pose a threat to some teachers. This can only be overcome by support from their administrators and the EEC staff.

3. EE is not totally a cognitive process. It is the product of a dynamic growth cycle incorporating the affective growth of the

EEC staff, teachers, parents and students. It is this process rather than any product which has strengthened and focused plans at the Environmental Education Center. *Earthwatch*, the competencies, the curriculum ideas will continue to evolve and be modified by staff and teachers but the product modification will occur in the context of a learning model for environmental education which has emerged. The following is a description of that model.

The Dynamic Growth Cycle: An EE Learning Model

Effective decision making is a primary goal of EE. Effective environmental decision making requires both the knowledge of policy formation and the possession of an environmental ethic. Ethics and policy formation cannot be separated. Policy is the product of the decision makers' ethics.

We propose a model that makes ethics formation central to EE at all grade levels and in all subjects. This model requires that ethics formation and effective decision making be interrelated and is a product of a dynamic growth cycle. It assumes that this growth cycle can be used to facilitate learning at all levels of instruction.

"Awareness" is defined as *increasing recognition* of oneself and all humans as part of the earth's biosphere. Awareness is not viewed as a static component which once acquired is then possessed through life. But rather, a lifelong process which is a function of continuing growth process.

"Stewardship" is defined as *increasing commitment* to act as a protector of the earth rather than as exploiter. "Stewardship" is an increasing commitment to a conservation ethic. Stewardship does not imply willingness to radically alter one's life styles.

"Adaptation" is defined as *increasing willingness* to alter one's life style to reduce environmental impact. It is an attempt to bring one's life style into harmony with nature. "Adaptation" implies concrete personal action which results in changes in the individual's behavior.

"Responsibility" is defined as the *adoption* of an *active role* in the *collective* decision making process. This active, community centered role means influencing others. This influence can be executed through the formal political process or less formal educational processes. The model assumes that any increase in "responsibility" will raise the "awareness" of the individual. As the degree of involvement increases so also does the recognition of the complexity and interrelatedness of environmental issues. Action completes the loop and the cycle continues.

The adoption of this learning model has the following implications for teaching and curricula:

1. Abandonment of the linear instruction model which stresses awareness in the lower grades and action in the upper grades. This does not imply mass reorganization of present methods

or curricula. It does imply the need for the teacher to be aware of the opportunities for growth within the cycle regardless of the specific focus of a lesson.

2. The teacher must view his own personal commitment to environmental education as expanding and the outcome of a dynamic growth process. Awareness, Stewardship, Adaptation and Responsibility become the web in which the teacher is an integral part.

Conclusion

Although this approach to the development of curricula materials seems long and complex, it is based on the belief that by incorporating EE concepts into an on-going curriculum several benefits can be derived:

> First, continuation of EE instruction can be assured, without the necessity of massive external funding sources.
>
> Second, by incorporating these concepts at appropriate places in many areas of study, EE can remain dispersed throughout the curriculum and not become a specific entity or source that should be taught at a certain grade level. This allows students to be introduced to environmental materials at all grade levels and in almost all subject areas in a subtle, reinforcing manner, assuring the transdisciplinary nature of EE.
>
> Third, by allowing teachers to introduce environmental concepts within the framework of the courses they are already teaching, their confidence in themselves and the materials can be maintained, and the need for extensive teacher in-service training can be kept to a minimum.

We understand learning to be a change in either behavior or in pattern of thinking which follows upon an accumulation of experience. The development of Earthwatch and the competencies resulted in the evolution of the growth cycle. With the conceptualization of the growth cycle, it is our "responsibility" to return to Earthwatch. Our efforts must focus on adapting Earthwatch activities to growth cycle philosophy.

Acknowledgments

We gratefully acknowledge the patience, good humor, and assistance of Cecelia Zych in typing and retyping the manuscript.

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STUDENT ECO-ACTIVISTS REVISITED: LONG-TERM CORRELATES OF EARTH DAY

A. Clay Schoenfeld[1]

Students of social forces and voluntary action (Albrecht 1972; Morrison 1973; Harry 1975) have reported previously on various environmental movement phenomena. This study explores some apparent long-range consequences of active youth involvement in the massive national environmental teach-in and associated campus environmental protests, 1969-70.

Earth Day, 22 April 1970, has been described as "the largest, cleanest, most peaceful demonstration in America's history" (Cotton 1970). An estimated 20 million people of all ages and shades participated (NSEA 1970). Nearly half of the four-year colleges in the country sponsored demonstrations, double the number that experienced anti-Vietnam protests (Astin 1971). E-Day is said to have elevated "environmental quality" overnight into the general public ken as a "social problem" (Dunlap and Gale 1972).

Who were the college and university students who led the E-Day teach-ins on the campuses of the country in 1970? Dunlap and Gale (1972) surveyed students very active in environmental campaigns at the University of Oregon, 1969-70, compared them with a representative sample of the whole Oregon student body, and contrasted them to Oregon students active in Students for a Democratic Society, the "radical" movement of the time. What Dunlap and Gale found was not what some E-Day observers have held, that E-Day managed to bring together students from all hues of the political spectrum (Janssen 1970). At least at Oregon, the new left and conservatives were simply not represented among E-Day student leaders. The Oregon E-Day activists were not very distinguishable on most counts from the Oregon student rank-and-file, except of course for their leadership qualities.

The situation may have been somewhat different on some other campuses. At the University of Wisconsin-Madison, for example, SDSers initially tried to take over E-Day organizing, but they were frozen out by a coalition of "good liberals." Students of the far right at Madison were equally ineffective in making a presence felt (Schoenfeld 1970). Nationally the adult far left not only largely boycotted E-Day, it railed against environmentalism as a WASP cop-out from social issues like civil rights and poverty and as a capitalist smokescreen to divert attention from Vietnam (Barkley and Weissman 1970). Meanwhile the DAR and Robert Welch saw E-Day as a Communist plot to subvert America. After all, wasn't April 22 Lenin's birthday? (Allen 1970).

If E-Day student leaders were in the middle of the campus road, that would still place them somewhat to the left of the American center, even if not quite as far left as their fellow activists in pro-civil rights and anti-Vietnam protests. What happens to such activists once they leave college? Are they upwardly mobile in some traditional career, co-opted by "the system"? Or have they dropped out in university ghettos or rural communes?

---

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The answer, according to Fendrich (1973), is "neither of the above." At least in the case of Florida State alumni who had been active in civil rights demonstrations on that campus in the 1960s, they have "combined ideological commitments with their occupational and political orientations," Fendrich found. That is, uniformly they are found vocationally in the so-called "helping" professions, while avocationally they continue to be committed to social reform.

We find the same characteristic when we trace what has become of student E-Day leaders. By and large they remain environmental activists, albeit in institutionalized ways, and their life styles represent a compromise between ecology and economics. In other words, they have made their peace with the necessity of producing goods and services that somebody will pay for, but they are no devotees of good old American conspicuous consumption.

From colleagues at the universities of Cornell, Hawaii, Indiana, Iowa, Lehigh, Maine, Michigan State, Minnesota, Mississippi, Missouri, Nebraska, Nevada, North Carolina, Wisconsin, and Washington, I got the current addresses of 30 former student E-Day leaders. To each of them I wrote a personal note asking them what they are doing today. I heard directly or indirectly from 25.

A star E-Day alumnus is M. Rupert Cutler. On April 22, 1970, as a graduate student in resource development, he was one of a half-dozen key individuals at Michigan State University who put together the East Lansing Earth Day program. After a hitch on the MSU faculty, Dr. Cutler is now Assistant Secretary of Agriculture for Conservation, Research, and Education, and the scourge of the USDA Forest Service. One of his campus cohorts, Michael Freed, is now on the forestry and recreation faculty at Oregon State, and another, Malcolm Taylor, is a member of the New Hampshire state legislature.

As a Yale law student, Gus Speth had begun in 1968 to help organize the Natural Resources Defense Council. Today he is a member of the President's Council on Environmental Quality. At Harvard in 1970, Kathy Fletcher was a member of a student environmental committee; now she is a member of the President's Domestic Policy and Planning Staff.

When E-Day Leaders Terry Cornelius and his wife Laurie first left the University of Washington campus, they spent a couple of years roughing it in the wilds of Canada. Now they have 40 acres of timber and farmland in rural Clark County, Washington, where they are experimenting with alternative heating systems. To finance their "love affair with the land," Terry sells insurance for State Farm Mutual. Their small son Tyler they are "raising to be a true 'Citizen of the Galaxy'."

One of their fellow E-Day leaders, Gil Peterson, is on the faculty of Huxley Environmental College at Western Washington State. Another, Bob Pyle, is a regional Nature Conservancy land steward in Portland, Oregon.

Bob Pyle may be the quintessential E-Day alumnus, "remaining active in the environmental field but in a rather more formal manner than when I led a Life-After-Death Resurrection Plant-In." Now a Yale Ph.D. in insect conservation ecology, he has founded an international society for invertebrate habitat conservation, worked for the government of Papua New Guinea on a butterfly-protection plan, chaired the Lepidoptera specialist group of the Survival Service Commission, International Union for the Conservation of Nature, and now manages Nature Conservancy preserves in the six-state Pacific Northwest.

A Cornell E-Day Teach-In coordinator, R. C. Hinman, is now an Oregon State agricultural extension agent involved in "a wide spectrum of environmental issues" in a two-county area in northeastern Oregon. He, his wife, and their two children share "special personal interests" in gardening, hiking, wood burning, solar heat, close friendships--"to strive toward a rewarding life style." D.C. Lacate was another Cornell E-Day activist. Today he is director of a new regional office of the Lands Directorate, Federal Department of Environment, Vancouver, British Columbia. His job: "to review, examine, and make recommendations on the environmental impacts of proposed major federal projects in the region, like deep sea ports, airports, highways, pipelines."

Tom Schrunk headed the "Clean Up Coralville Reservoir Day" at the University of Iowa in April 1970. Now he has his own Schrunk Restoration Studio, Inc., specializing in restoring old stained-glass windows in churches and installing storm glazing "to cut heat loss dramatically." He and his wife are on a personal energy conservation campaign, but business and studies "don't allow much time for other environmental activism." For Dave Kent, Lehigh '70, likewise, "age, responsibilities, and the need to make a living have taken me further away from activism that I would like to be." He's learning the publishing business with Simon and Schuster in Atlanta, Georgia, but he still believes "in very much the same things I did in 1970." Dave is looking for a manuscript like *Silent Spring* or *Future Shock*: "all the whining and petition-signing will not ever be as effective as such books." One of his Lehigh classmates, Michael Golden, is an environmental investigative reporter on the Chattanooga, Tennessee, *Times*.

In 1970 Robert E. Frangenberg represented the University of Nebraska Student Council on the Omaha E-Day Committee. Today he is director of health for the Washoe Indian Tribe of Nevada and California. He continues to be "deeply involved and interested in environmental issues," particularly where they relate to human health and behavior.

At the University of Missouri-Columbia, James W. Buesing was E-day finance chairman. He went on to do a novel master's thesis in interior design on "Principles of Home Energy Use and Conservation." He now heads a program of public education in housing design ethics in University of

Wisconsin-Extension. E-Day colleagues of Buesing who continue to be "ethically influenced by environmental responsibility" include Jeff Middaugh, forest and land management specialist in Salt Lake City; Tom Moran, air and water pollution engineer, Redding, California; Ron Hopmeir, Arnold, Missouri, landscape architect; and Mary Lous Davies, earth science teacher in Garland, Texas. Professor Buesing says such alumni are "established and knowledgeable--not the counter-culture, mother-earth types that are usually long on enthusiasm but short on knowledge."

In 1969 the U.S. Navy sailed into northern Wisconsin to lay a grid of communication cables under 26 counties so it could broadcast attack orders to nuclear subs submerged at stations around the world. The Navy had survived Pearl Harbor but it didn't survive Lowell Klessig. As a University of Wisconsin environmental activist, he organized a statewide grassroots campaign that effectively sank the admirals in Wisconsin at the time. Today Dr. Lowell Klessig is at Madison as head of the Environmental Resources Unit in UW-Extension--and still keeping an eye on a determined Navy from his cabin outpost in northern Wisconsin.

When UW campus officials proposed to make a parking lot out of a wetland at the far west end of the campus in 1969, another UW student environmental activist, Richard McCabe, and his cohorts pitched tents in the path of the dump trucks. Today the scenic marsh is still there, and Dick is publications editor for the Wildlife Management Institute in Washington, D.C.--when he isn't birdwatching in Virginia. A third UW E-Day leader was Sheryl Stateler Smith. Her "household action" guide to ecological life styles, distributed door-to-door by Girl Scouts, won a Capital Citizens award. Today she edits environmental reports for county, state, and federal agencies--and is "a violent writer of letters of protest." She spends as much time as she can "in the boonies" around Madison.

There is really a striking pattern that seems to emerge from this look at a score of E-Day student activists responding after a decade. Almost without exception they are in social service or creative professions directly or indirectly associated with environmental issues, and their personal life styles reflect an ecological conscience. So there is considerable continuity between their current situations and the actions they took in college nearly a decade ago. They form what Fendrich and Tarleau (1973) call "a distinctive generational unit."

The campus E-Day leaders I tracked were the local "militia." The federal "regulars" were the dozen young people martialed temporarily in Washington, D.C., by E-Day Co-Chairmen Congressman Paul McCloskey and Senator Gaylord Nelson. What has become of that cohort?

As an experienced young "protester," Denis Hayes came to Washington from Stanford and Harvard to become E-Day national coordinator, and he is still very much the dedicated environmental activist today, specializing in environment-energy issues. Based at the Worldwatch Institute in the national capitol, Hayes masterminded Sun-Day and was chairman of the board of directors of the Solar Lobby. Now he heads a federal energy research center in Colorado, supervising a multi-million dollar budget.

Steve Cotton, E-Day press relations chief, is now with the Center for Law and Education in Cambridge, Massachusetts. Andrew Garling, northeast regional coordinator, is surgical house officer, Kaiser Foundation Hospital, San Francisco. Steve Haft, fund-raiser, with the American Civil Liberties Union in New York City. Phil Michall, office manager, still with Environmental Action in Washington, the spinoff organization from the original E-Day crew. Linda Katz, an assistant coordinator, a doctoral student in city and regional planning at the University of Pennsylvania.

In response to social problems, Americans typically turn to retreat, revolt, or reform (Kelly 1975). The national E-Day leaders responding are clearly in the ranks of reformers. A case in point is Jody Moody, 1970 receptionist. In Tuscaloosa, Alabama, today, she is "intensely active" in state and national Democratic politics, and "in environmental concerns like strip-mining, the Tenn-Tom waterway, impacts of new industry, air and water pollution, and future planning."

The prize for activism in what she acknowledges are "establishment ways" would probably have to go to Barbara Reid Alexander, midwest coordinator in 1970, now a wife-mother-environmental lawyer operating from an 80-acre plot near Readfield, Maine, "happily ensconced in a backwater, but with lots of activity"--environmental quality chair for the Maine League of Women Voters, on the board of the National Clean Air Coalition, Chairman of the Mt. Vernon Board of selectmen, "member of various and sundry other groups."

If there is any young national E-Day leader who doesn't now quite fit the "institutionalized" pattern it is Sam Love, erstwhile southern coordinator. After a lengthy stay with Environmental Action, Sam is now half in retreat and half in revolt, touring the country presenting to college audiences a slide show called "Visions of Tomorrow." Sam's objective: "To increase the levels of schizophrenia in America, because if people recognize that the way we live makes increasingly less sense--if that tension increases inside--then people will be motivated to seek out alternatives." Troubadore Sam thinks the environmental movement is now "too tame," "not outrageous enough." But even Sam has an agent--Lordly and Dane, Inc., Boston.

So Denis Hayes and his colleagues are continuing to lend life and enthusiasm to social action, albeit "through channels," even counting Sam Love. They have become neither grey-flannel-suit types nor rebels without a cause; they are in the American progressive tradition.

If anything speaks to the durability of environmentalism, it is the evidence in this reconnaissance that, for many young people, Earth-Day was not a momentary fling but an introduction to life careers in environmental action. The presence of this maturing cohort in the crossroads and cosmopolitan centers of the country can increasingly lend an environmental tilt to public participation in resource management decision-making.

From birth onward, each human being undergoes what sociologists call a "socialization process" which links that person to groups and to society whereby attitudes, habits, skills, and social standards of judgment are transmitted to people through their group involvements and their interactions with other human beings. In this process each of us acquires a personality, a unique constellation of attitudes, and even a conception of ourselves. Socialization is a lifelong process, and each person is both a product of it and an agent engaged in socializing others whenever he or she interacts (Robertson 1977). We cannot say, of course, from the study at hand whether Earth Day leaders "socialized" their E-Day clientele, or were "socialized" by E-Day, or some of both. In any case, environmental education appears to have been at work.

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REACHING URBAN YOUTH THROUGH ENVIRONMENTAL EDUCATION

Paul Sears,[1] Linda Martorano,[1]
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In 1974, the Council on Environmental Quality submitted a report on the environmental status of urban areas. The report showed that the lower income urban dweller bears a much heavier burden of pollution and poorer environmental quality than do those people residing in higher income areas (Miller 1975). No other group in our society has greater need for environmental awareness than the residents of our cities, where high densities of automobiles, industry, and people intensify all levels of pollution. Working exclusively in this setting, the Rutgers Environmental Education Outreach Project (REEOP) seeks to promote environmental awareness and knowledge among one of our greatest resources--the youth residing in urban areas.

REEOP's History

REEOP has been operating for about five years in the public elementary schools of New Brunswick, an urban community of about 46,000 situated in central New Jersey. Starting with only a handful of volunteers, REEOP has expanded greatly since it began. During the past two years the group has involved more than 1500 urban children in environmental education activities. REEOP presently has over 65 active members with some 40 of these serving as volunteer teachers. The project is co-sponsored by Rutgers Community Action (RCA) and Rutgers Environmental Action (REA).

Project Goals

The primary goal of the project is to promote in children an awareness of their total environment. The scope includes the familiar urban area, as well as environments generally inaccessible to many young people living in the city. Through discussion and compare/contrast type of activities REEOP seeks to teach students about the interrelationships occurring both within and between their own familiar surroundings and those less familiar to them.

In addition to developing an environmental awareness, the project seeks to foster a lifetime concern for a student's personal environment and for environmental quality in general. REEOP attempts to foster the development of positive environmental values, hoping that experiences in these early years will lead to more responsible and positive environmental decision-making in the future.

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Using innovative teaching approaches and a wide variety of activities, REEOP aims to provide New Brunswick children with brief, motivating breaks from the daily classroom routine. REEOP seeks always to bolster and enhance both the learning of environmental concepts and basic skills by integrating them in regular classwork when and where possible.

The major goals of REEOP then, are:

1. To promote children's awareness of the total environment;
2. To teach environmental interrelationships;
3. To nurture lifetime concern for the environment;
4. To develop positive environmental values and decision-making;
5. To break daily classroom monotony;
6. To integrate basic skills with environmental concepts; and
7. To have children apply learned environmental concepts to their everyday lives.

Implementation

Since REEOP works within the structure and time frame of the New Brunswick public elementary schools, specific time slots for environmental lessons, and, when appropriate, the classroom setting itself, are available for REEOP teachers. All volunteer teachers are encouraged and aided to develop their own lessons and teaching methods. This tends to provide REEOP and REEOP teachers with a continuing source of fresh ideas and approaches.

The range of lessons that the project offers to the students is as broad as the environmental spectrum itself. Classroom teachers request certain time slots and topics, and volunteers are matched with these according to availability and interest. Some exemplary and much requested topics include plantlife, endangered species, geology, climate and weather, extinct animals, air pollution, water pollution, energy, and urban environments.

The approaches used in presenting these topics also span a wide range. The overall attempt is to reduce classroom monotony--getting the "kids" away from their desks and out of the classroom, even leaving the school grounds completely, an activity frowned upon in most urban school districts. The activities directed toward this goal range from informal classroom discussion to full-day field trips, using vans provided by the Rutgers Community Action organization. Another method frequently employed to "change the pace" is the introduction of live animals into the classroom. These might be hamsters or parakeets for a pet-care lesson; chickens and piglets for a class on farm animals; sometimes we even bring the project's mascot, a six-foot boa constrictor named Alice, into the classroom. Plants of various kinds are also used for both demonstration and experimentation.

REEOP is fortunate in being affiliated with Cook College's environmental and agricultural programs and having access to its many diverse resources. Also, over the years the project has accumulated its own battery of resources, ranging from a small library to an incubator for chick eggs.

Problems Encountered

While REEOP has many strengths, its organization and setting have presented some problems. One of the major difficulties that the project has encountered is best introduced with a statement made by Elwood L. Shafer in a paper presented at a 1975 symposium, "Children, Nature, and the Urban Environment." Shafer stated that "children in cities can become adapted to almost anything--polluted air, treeless avenues, starless skies, aggressive behavior, and the rat race of overcompetitive societies" (p. E30). The challenge REEOP faces, then, is to try to engage urban students to examine their surroundings objectively, an important step in evaluating their environment and its problems. This is often difficult because few urban children have the opportunity to experience other environments and make comparisons.

REEOP attempts to counter this problem by exposing children to other environments through field trips, movies, nature walks, etc. In a Piagetian sense, we attempt to establish a sense of disequilibrium in order to promote growth. Although urban children have contact with other types of environments through media such as television, they do not always get an accurate picture. For example, while presenting a plant lesson in a third grade class, I once had a child argue and insist that plants could walk because she had seen it on T.V.

Although an all-volunteer program does afford great diversity and innovation, it also allows little time for training prospective teachers. The problems of tailoring a lesson to different age levels, recognizing varying attention spans and variations in cognitive development, and dealing with bi-lingual or special education classes are all very formidable to even an experienced classroom teacher, much less the intermittent volunteer. The project attempts to counter these problems by working with new volunteers in "pre-teaching" meetings; pairing "green" volunteers with "old hands"; setting up observations of teaching techniques; and running lesson plan seminars. These efforts by no means erase the problems, but the regular classroom teachers are always ready to lend a hand in bringing the program to their students.

One of the more difficult problems REEOP encountered was the "Back to Basics" movement. When the state of New Jersey implemented the 1978

Minimum Basic Skills testing program, New Brunswick's scores emerged overall as the lowest among New Jersey's 612 public school districts. This revelation triggered an immediate panic in the school and the community as well. All "frills" were to be cut from the school curriculum. REEOP had a long, hard fight to prove that it was more than a frill. Integration of the 3 "R's" with environmental concepts became a major factor in this battle. It was shown that environmental lessons integrated with the basic skills do not take away but in fact complement teaching for basic skills development. Teaching basic skills through environmental education would develop and extend the basic skills concept. Many of the REEOP staff felt that a major reason behind the low scores was a lack of these so-called "frills" and diversions; hence stagnation, boredom, and apathy resulted in the classroom.

Positive Feedback

Working in REEOP has many rewarding moments and introduces both the volunteer and urban youth to new, undiscovered worlds. The volunteers have the extraordinary experience of working with what in reality are enthusiastic, bright, questioning young people. Most REEOP volunteers feel that their own horizons have been expanded at least as much as those of the children. It is as if secrets are being uncovered and treasures are revealed--"Carrots grow in the dirt?!"; "Snakes can be friendly?!"; "In the Arctic it can be dark all day?!"; Some very exciting moments are shared across boundaries of age, race, and background. The same children taught in the classroom are often met on the playgrounds and in supermarkets. Volunteers often become models, heroes, best friends, big brothers and sisters. REEOP has the opportunity to open new doors for New Brunswick's school children, and the appreciation is never voiced in small ways. For a long time co-director, Rich Marx, was known as Captain Ecology; Alice, the boa, became a legend in all the schools. One never forgets the feeling of standing in front of 30 happy children and listening to a chorus of "Thank you, Mr. Sears."

Future Goals

Although those of us in REEOP feel that many of our goals are being met, we are by no means content to remain only with our present programs. We want to involve the project with students at all age levels and add programs to include schools in other areas. We also want to meet the needs of the general public by bringing environmental education to the entire community. New programs are presently being planned and developed to help achieve these goals.

One outgrowth of the REEOP project is the development of a nature trail through Joyce Kilmer Woods, the Rutgers Ecological Preserve. This trail will provide a resource for all students from New Brunswick and neighboring Piscataway, and the faculty and students of the University. Construction of the trail also offers the opportunity for REEOP classes to become involved. Bridge building, spreading wood chips, putting up interpretive signs, and removing trash from the area are just a few of the activities planned.

A newly completed environmental coloring book designed, illustrated, written, and printed by REEOP volunteers, is viewed as a technique which encourages children to take some environmental education home with them.

The other ways in which we hope the project will expand reflect a desire to work with the entire community--environmental film fairs, mini-courses dealing with energy conservation in urban areas, family field trips to natural areas outside the community, and other kinds of fairs with themes relating to environmental concepts and issues.

These short and long-term goals are all ultimately directed toward producing a complete environmental education program. Such a program will start with elementary school children, follow them through secondary schooling, and provide a continuing source of information to the urban dweller as an adult. Educating urban dwellers about their immediate and other environments that make up our world will equip them with the knowledge and tools necessary to successfully live in and improve their surroundings.

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AN INTERNSHIP IN NON-FORMAL ENVIRONMENTAL EDUCATION

Thea Teich[1]

Internships are almost an essential part of environmental education training. The variety of organizations and agencies involved in environmental education is so great that few academic programs can offer insight into all its possibilities. The internship is the training ground where the student is supposed to incorporate all he has learned and apply it to the situation at hand.

Of course, it is here that the simple directive, "incorporate and apply," mentioned above, may break down. Agencies, educational and otherwise, and organizations involved with environmental education, are like other public and private institutions. Their goals and policies are subject to tradition, public pressure, and the vagaries of politics. Thus, to develop an internship that involves a student in anything but the most immediate and day-to-day levels of program planning and implementation takes coordination, communication, and courage.

The Leonard S. Mudge Environmental Education Program of the Carnegie Museum of Natural History developed such an internship that involved not one, but three, different agencies with three different sets of policies, missions, parameters, funding procedures, organizational set-ups, governing bodies. All were, however, concerned with non-formal environmental education.

The three sponsoring agencies were the Carnegie Museum of Natural History, a major collections, research, and educational institution, almost entirely privately funded through endowment, grants, memberships, and admissions; the Allegheny County Department of Parks, Recreation, and Conservation, an agency responsible for more than 15,000 acres of natural and recreational land ringing the county, almost entirely publicly funded; the Beechwood Farms Nature Reserve, a new 90-acre nature center owned by the Western Pennsylvania Conservancy and operated by the Audubon Society of Western Pennsylvania, both private organizations, funded through grants, gifts, and program admissions, now undergoing facilities expansion.

Carnegie Museum of Natural History's concept of internships is that they should be designed as pre-professional training programs. Therefore, most of the museum-sponsored internships are restricted to graduate students; most are lengthy; most include a stipend.

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The internship in non-formal environmental education followed this pattern. It was aimed at graduate students and organized into a year-long program. Funds for the stipend were secured from the Hunt Foundation in Pittsburgh and the Lower Great Lakes Environmental Internship Program in Cleveland.

The major concern of the internship's planners was that many college-trained individuals obtaining positions in non-formal environmental education have little knowledge of how agency or organizational policies actually determine program parameters. Although at the day-to-day implementation level programs often depend upon immediate funding conditions, there is another "sieve," broader in scope, through which program ideas must pass. These are the overall goals of the agency and organization, agendas which may not be thoroughly understood by program implementation staff or thoroughly articulated by program administrators. For example, Carnegie Museum of Natural History's educational program must broaden understanding of its research, collections, and exhibits activities and "serve as the primary regional resource for increasing knowledge about the natural environment and man's role in it." The Allegheny County Department of Parks, Recreation, and Conservation's education program must be concerned with the department's recreational agenda as well as the need to protect the sites under department control. Beechwood Farms Nature REserve, as a new nature center, involved in building up its audience and its funding sources, must emphasize its site and program potential. It must also be concerned with the policies of its two sponsoring organizations.

However, all three of these agencies are involved with non-formal environmental education and might employ a newly graduated environmental educator. That person would then have to fit in.

The first year's experience with this internship program is complete and a new intern will begin the program in September, 1979. The experience has enabled an individual to work with three agencies, each with a function it can best perform. Thus, the intern has gained insight into the workings of each system and is now better equipped to succeed wherever she obtains a position.

THE FORMATION OF THE SOUTHERN REGIONAL ENVIRONMENTAL EDUCATION COUNCIL (SREEC)

Terry L. Wilson[1]

Introduction

Throughout the 1970s, projects and programs in environmental education have evolved from a variety of organized interests. Educational agencies and institutions, resource management agencies, non-governmental organizations, as well as business and industry, have urged the development of formal and non-formal educational programs that would create in our citizenry a better understanding of our world and its functions.

This cry for action has been felt by many state agencies which, to varying degrees, have responsibilities to offer guidance, direction, and coordination to the local and regional governmental entities in their states. And since environmental education is aimed at reaching people through a combination of formal and non-formal efforts, state education agencies as well as state resource management agencies have been working toward effective statewide environmental education programs. The roles of these agencies in the planning and implementation of statewide programs and the specific tasks facing their respective environmental education personnel are sometimes unclear. The need for sharing ideas and resources with each other and with agencies in other states is continually evident.

On February 5-7, 1979, the Center for Environmental Education at Murray State University hosted the conference "Environmental Education: Planning for the South," through the joint sponsorship of the American Forest Institute and the Tennessee Valley Authority. The meeting was held at Brandon Spring Group Camp, Land Between the Lakes, in west Kentucky and Tennessee.

Two individuals from each of the 13 southern states were invited. One individual was the Environmental Education Consultant/Coordinator/Supervisor in the state department of education. That representative contacted and invited an environmental educator from a state resource management agency or commission. All 13 states were represented as 24 environmental educators attended.

The goals of the meeting were to:

1. Determine the desirability and feasibility of a regional EE effort by state agency representatives.
2. Determine common concerns of state EE development in the South.
3. Exchange ideas and identify EE resources in the South.

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4. Produce a "state of the art" report on state EE development in the South.

Conference Format

The format for the two and one-half days of discussions was designed to produce a composite of objectives and strategies for implementing those objectives. The objectives would be aimed toward the stated goals of the conference.

I. Status reports of the states - Each representative gave an informal report of his or her agency's environmental education efforts.

II. Regional environmental education efforts - General remarks were made by Dr. David Phillips of the U.S. Office of Education with regard to some of the regional EE programs undertaken in recent years. Particular attention was given to the Western Regional Environmental Education Council (WREEC), which involves 13 western states and has an ongoing membership similar in representation to those attending this conference. Dr. Phillips cited many of the successes as well as the problems associated with the continuing development of WREEC. Many of his comments encouraged the creation of such a council in the South.

III. Discussion of the possible purposes of a Southern Regional Environmental Education Council - As an aid in determining the need and desirability of a southern organization, a process was initiated similar to the one used at the National Leadership Conference on Environmental Education conducted in March, 1978, by the Alliance for Environmental Education. The steps of this process are designed to produce a maximum of group input in a minimum amount of time.

Step 1. Each participant was asked to list approximately five possible purposes or objectives of a southern regional council. Each person then shared with the group one of the objectives he or she had listed. This was continued throughout the group until all objectives were recorded.

Step 2. The 31 objectives generated were then grouped into five broad categories. The categories were: Research, Planning, Program Development, Communication, and Environmental Education Advocacy.

Step 3. The participants divided themselves into groups corresponding to the five categories. (Because of the size of their groups and some overlapping of objectives the "Communication" and "Advocacy" groups merged into one.) Each committee had the task of putting the objectives in its category in a priority order and then proceeding to discuss as many of the objectives as time permitted. The discussions were patterned to a) state the objective, b) identify the target audience(s) of that objective, (c) identify the constraints to accomplishing the objective, and d) establish a time frame for completion of the objective or, as in some cases, indicate that an objective requires continual action.

Step 4. Each group then presented the results of its discussions with the entire group of participants.

Results

The following is a functional listing of the purposes of a southern regional environmental education council, as generated by Steps 1 and 2 of the discussion process.

A. Research

1. Establish baseline information of EE activities in public schools, resource agencies, and colleges
2. Conduct state surveys on environmental education status including:
    a. Staff
    b. Materials
    c. Facilities
    d. Plans
    e. Needs Assessments
    f. Degree Programs
3. Inventory non-formal and formal EE resources
4. Focus recommendations on needs of specific states, as they are requested
5. Provide evaluation instruments to provide data that "it (EE)" works
6. Evaluate environmental education materials
7. Identify opportunities for environmental education that use no new funds
8. Determine "where kids are" in environmental literacy
9. Encourage more basic research in environmental education

B. Planning

1. Help states develop/implement environmental education plans
2. Enact non-formal as well as formal state plans
3. Assist in establishing environmental education councils on state levels
4. Adopt/adapt process for project implementation avoiding unnecessary duplication through information exchange and planning
5. Develop process for involving the implementers in the planning process

C. Program Development

1. Inservice training for ourselves should be developed
2. Identify teacher competencies and skills for undergraduate degrees
3. Establish the most effective in-service mechanisms aimed at both classroom teachers and administrators
4. Establish model pre-service education programs
5. Support pilot projects on multi-state levels as positive examples
6. Develop a strong theory base
7. Develop grants writing program

D. Communication

1. Promote general cooperation among the states
2. Establish clearinghouse and communication system among states
3. Establish speaker/consulting bureau
4. Serve as consultants to each other
5. Exchange state contacts

E. Advocacy (Environmental Education)

1. Provide advocacy, "pressure," and establish priorities for EE development
2. Influence funding policies of the Office of Environmental Education
3. Identify "selling" techniques for environmental education, directed toward administrators and others
4. Support EE (non-formal and formal) at local, state, and national levels
5. Be a linker between state and federal funding sources

Conclusions

During Step 3 the committees discussed, as time permitted, several of the objectives listed under each category. The large quantity of information generated by the committees was then presented to the entire group.

After the committees had shared the results of their work (Step 4), a discussion began directed toward the question of whether or not to officially form a southern council. During the discussion, many participants pointed out that the large amount of data that had been shared in just a few days of work came about because they had worked together in an unselfish and organized fashion. A motion to formally organize the Southern Regional Environmental Education Council (SREEC) followed and passed.

The agreement to organize led to several group discussions. Mechanisms were established that would continue to strengthen the lines of communication that had been opened at the conference. These avenues would increase the cohesiveness of this new regional effort, while improving each statewide environmental education program. Among these were the continuation of an annual conference at which to assess the work of the organization. A newsletter would be established which would provide feedback on the conference and serve as a communication tool within the organization.

These mechanisms would initially look for an appropriate procedure for adding to SREEC a membership component comprised of one representative of higher education from each state. These efforts are to be coordinated through the Center for Environmental Education at Murray State University.

The conference at Land Between the Lakes established a base from which these individuals can continue to improve the environmental education programs of their respective agencies. In addition, the information generated there indicates that the Southern Regional Environmental Education Council will become a viable, active organization, dedicated to openly sharing ideas for the betterment of the environmental education movement.

GUIDELINES FOR AUTHORS

GUIDELINES FOR AUTHORS

Manuscripts to be considered for publication in *Current Issues: The Yearbook of Environmental Education and Environmental Studies* must be accepted for presentation at the annual conference of the National Association for Environmental Education (NAEE). Such acceptance is a function of the Program Committee for the conference.

The *Yearbook* is divided into two sections. Section I, "Refereed Papers," is comprised of scholarly articles representing the findings of original research and thought. Papers in Section I must be fully documented and must show an awareness of existing research. Papers will be accepted for publication in this Section only after review and recommendation by two independent reviewers and the editors. Section II, "Notes and Commentaries," is comprised of shorter papers which offer information, observations, and program reviews deemed of interest to the community of environmental educators broadly interpreted.

Manuscript Preparation

1. *Manuscripts*: Manuscripts for Section I, "Refereed Papers," must not exceed 5000 words in length. Manuscripts for Section II, "Notes and Commentaries," must not exceed 1500 words in length. All manuscripts must be clearly marked indicating the specific section to which it is being submitted for consideration. Five copies of all manuscripts must be submitted, typed using a standard type-face, double-spaced, with standard margins and approximately 250 words per page. Single-spaced typed papers will not be considered.

2. *Abstract*: All papers submitted for Section I, "Refereed Papers," must include an abstract of approximately 50 words which presents the salient points covered in the paper. Abstracts will *not* be printed for papers appearing in Section II, "Notes and Commentaries." Abstracts should appear immediately following the paper's title and name of the author, and directly preceding the text (on the same page).

3. *References*: All references must be presented using the author-date reference system within the body of the text (e.g., Sacks and Davis, 1979); with each paper followed by a Reference Section listing full references in alphabetical order according to the last name of the author.

4. *Figures*: All figures, drawings, and graphs must be sequentially numbered (Arabic) and must be cited in the text. Provide camera-ready copy in black ink (preferably India), on heavy white paper or blue-lined coordinate paper, and on separate sheets. Place labels parallel to the axes, using initial capital and lower case letters. Plan your figures for the smallest possible printed size consistent with clarity. Care should be taken to make lettering large enough to be readable after reduction to the 5 x 7 inch print format of *Current Issues*.

5. Tables and Photographs: Tables must be sequentially numbered (Arabic), titled, and cited in the text. Photographs cannot be printed.

6. Title and Author(s): For the format of the first page and the listing of title and author, see examples contained in this volume.

7. Additional Typing Instructions: Place the name of the senior author and the page number in the upper right corner of each page of the text. This will assist the editors should pages of the paper become separated. Insert subheads at appropriate places in the text to mark main ideas. Keep subheads short. Proofread manuscripts thoroughly before submitting them. Poorly written and poorly proofread papers will be returned to authors.

Deadline for Submission

Manuscripts must be received by the editors not later than 30 days prior to the annual conference. Send to: Dr. Arthur B. Sacks, Institute for Environmental Studies, 70 Science Hall, University of Wisconsin-Madison, Madison, Wisconsin 53706.

If you wish confirmation that your manuscript has been received, please enclose a stamped, self-addressed post card.